MEDIA MONITORS

Transcript

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Item:	ADDRESS TO THE NATIONAL PRESS CLUB BY PROFESSOR BARRY MARSHALL, AC, SPEAKING ON "EXTRA VALUE IN MEDICAL RESEARCH: LESSONS FROM THE NOBEL PRIZE".		

Audience:	Male 16+	Female 16+	All people
	4000	4000	8000

LAURIE WILSON: Ladies and gentlemen, welcome to the National Press Club for today's National Australia Bank address. It's not often that we have a Nobel laureate as our guest speaker, and today is one of those special occasions. It's a great pleasure to welcome back, because he has addressed the club before, Professor Barry Marshall.

As everyone in this room knows, and I'm sure many Australians know, together with his colleague Emeritus Professor Robin Warren, Professor Marshall effectively revolutionised the treatment of peptic ulcers, stomach ulcers.

Now, in addition to the Nobel Prize, Professor Marshall, of course, has won numerous prestigious awards internationally. Today, he's about to add to that collection, as the 2011 Medallist for the Australian Society of Medical Research.

To present the award, I'd like to invite the Chief Executive of the NHMRC - the National Health and

Medical Research Council - Professor Warwick Anderson to say a few words.

WARWICK ANDERSON: Thank you, Laurie. And, look, it's a great honour for me to be asked by the Australian Society of Medical Research to present the medal that they give each year to Barry Marshall.

I think everybody understands, Barry, what a marvellous gift you have given to humankind through your discoveries with Robin Warren.

The Australian Society of Medical Research is our biggest medical research society. I think there are about 13,000 members. It plays a very important in promoting health and medical research to the community and for the benefit of patients.

The NHMRC itself, Barry, is very proud of you. We have named our most innovative grant each year after you and Robin Warren to remind people that breakthroughs from left field are very, very important in health and medical research.

So congratulations and allow me to present the medal to you.

[Audience applause]

LAURIE WILSON: Thank you very much, Warwick Anderson. I won't say any more words. I think that is an appropriate

note to hand over to our speaker, please welcome him, Barry Marshall.

BARRY MARSHALL: Well, it's an honour to be speaking to you here at the Press Club. And I really didn't have any trouble finding material to speak about. And I thought I'd start off by saying that I do want to congratulate the Government and NHMRC for having at least kept the NHMRC funding up to scratch this year.

I had an early warning that there was possibly going to be reduced funding for medical research in Australia and I wrote a letter to the Prime Minister. And my letter really started off saying I really - I just can't believe that this rumour is true, that Australia would ever reduce medical research funding. I think that is one of the infrastructures that we have in this country and we have to keep it going. It just like electricity, law and order, water supply, NHMRC and, generally, any kind of research and development funding.

So one of the most important ones is medical research funding, of course. And if anyone says, my goodness, medicine is becoming so expensive, health care is going to be more expensive, we're all going to be crippled old baby boomers living in nursing homes, with all this money being spent on us, I don't believe it's true. I think this generation of baby boomers is going to be the healthiest group of elderly people - and I'm turning 60 this year, so I'm starting to think about those kinds of things - that we've ever had.

And studies so far in the United States have shown that although people are, you know, overweight and they've got blood pressure and all these kinds of things, the number of years people are spending in their retirement with a disability is going up a little bit because they are living longer, and, you know, you're not 100 per cent fit all your life, but the number of years that people are spending with dependencies is actually decreasing.

And so all that money that you see people - all that money that is spent on people in the last five years of their life, that happens now when you are 85 or 90 on average. If we're all living to 100, it's going to happen when we're 95 to 100. It's not going to start when we are 85. It is just going to start 10 or 15 years later.

And I'm looking forward to a long working life, longer than normal. So I don't have to actually compress everything in to the 30 or 40 years that parents had to, plus, I'm expecting to have a very healthy retirement.

And I will talk a little bit about genomics and personalised medicine because I think that is going to be relevant to all of us, and one of the things that we can start thinking about now to make sure that we are in that boat.

So let me get on to the title of my talk, which was related to Lessons from the Nobel Prize. And the

one message that you should take home is that advances come from discovering cures, and that comes from curiosity-driven research. This is research that is not particularly focused or directed. And it only comes from the universities and from the tertiary institutions, the research institutions. And we have to fund curiosity-driven researchers because although the pharmaceutical companies will tell you that they are discovering new drugs etc, in fact, pharmaceutical companies are marketing companies who, once they have found the new drug, they'll pass it through the regulators and you will get approval by the TGA etc. But at that point, there's no further research. Once a new drug or a new treatment is approved by the TGA, or in America, the FDA, it's then locked in stone and it costs hundreds of millions of dollars just to change it in any way, whether that's a drug or a device. So it's then going to be marketed. And so most of these companies are actually involved in marketing. And they may have an R&D arm somewhere, but in fact what they do is they just keep looking around universities and buying little start-up companies and buying intellectual property related to new discoveries coming out of the universities.

So, to give you an example from our discovery, remember we discovered helicobacter, the little bug that still infects about half of the humans on the planet, lives in the stomach. You catch it when you are about two years old and, ultimately, it could set you up to develop and ulcer or a stomach cancer.

Now, when we - Robin Warren and I came on the scene, we'd noticed these bacteria in the stomach. At that time, the ulcer drug treatment was called H2 Blockers. They were acid-lowering drugs. And the drug companies were making $3 billion a year profit. That was the first blockbuster drug. A blockbuster is more than $1 billion in sales.

So they were selling $3 billion a year, and ultimately went up to five, six or seven in the '80s. Now, that was the perfect drug for a pharmaceutical company. It's a drug that you have to take every day for the rest of your life, and you pay $2 a day. And there's no question that this drug was a big lifesaver. And people who had ulcers said this is great, now I'm having a normal life, I'm not going to suddenly drop dead from an ulcer because I take this medicine every day.

So that's where we were. And you can see once you've got that product out there, there's no incentive for a pharmaceutical company with a product like that to actually do any research or find a cure for ulcers. They say, Ulcers - it's genetic, it's impossible, it's too hard; we're not going to do R&D on the cause of ulcers, we're going to do R&D to find new reasons to take more of our ulcer drug. And so that's where the research was. And people didn't realise that in the '80s; they thought that pharmaceutical companies were R&D companies - not so.

So what happens? Out of left field Dr Warren and I suddenly see bacteria in the stomach. We were not interested in ulcers, we're saying how do bacteria live in the stomach? How do bacteria survive in ulcers? So that's a - just a little academic issue. Let's go and put them in acid and see how they grow, experiment on them. But lo and behold, after we had studied them for a year or so, we noticed - what do you know? Nearly everybody with ulcers have these bacteria. So, extrapolating, wouldn't it be nice if we could - if these bacteria caused ulcers, because then you could cure people with antibiotics.

So we wrote to everybody, we wrote to the pharmaceutical companies, and they were like, Please don't encourage these people, you know.

[Laughter]

And I - so I didn't - I - we felt rather paranoid, and ultimately I ended up in the United States. And then I started to understand what the situation was in medicine and in the pharmaceutical industries, because I gave an interesting lecture about helical bacteria, the cause of ulcers, in Chicago one day, and then the next day in *The Wall Street Journal* they commented that Glaxo shares, Glaxo-Wellcome shares, had gone from $21 down to $19.50 on the basis that their ulcer drug was going to be obsolete, so everyone's taking $3 billion a year off the bottom line. Well, luckily we've all got plenty of problems with acid, acid reflux et cetera these days, so Glaxo had the last laugh and actually

their shares continued up. But they don't sell that medication now for ulcers - it's for other things and now it's even over the counter.

So if we look at today, we move on 25 years and say what's the situation now, well I don't need to get a show of hands, but there are numerous people in this room, including me, who are taking Statin, the cholesterol-lowering drug. Now, no one - it's probably genetic; we don't really know why some people are more susceptible to having an elevated cholesterol, but you see we're all going to be paying $1.50 a day for the rest of our lives, presumably. And so that is a great drug, and the shares of all the pharmaceutical companies are based on statins - the world's number one drug, I think it is. So Merck, AstraZeneca et cetera, they're all getting $1 dollar a day out of us - that's not bad value for a product.

So do you think that those pharmaceutical companies are going to put $200 million research into finding the cause or an underlying fundamental cause of elevated cholesterol if it wasn't necessarily genetic? No. Of course they are doing no R&D on the cause of high cholesterol; they're doing R&D on making their drug safer, last longer et cetera, et cetera.

So you could also then say, Well, what else is there that we're taking everyday that is costing billions? And I could say, Well, okay - statins, high blood pressure. I could - really there's been very little advance in the cause of high blood pressure since I

was in medical school. We still - it's still a bit of a mystery, something to do with the kidneys maybe. And recently salt was found to be rather over-emphasised, which is good for me, I'm happy about that.

[Laughter]

So then the other one that I can think of straight away is rheumatoid arthritis, different kinds of arthritis. They are now treated and effectively, in quotes, cured. But in fact the patient stays on treatment, and guess what that treatment costs: $20,000 a year. And there are people here who probably know how many millions of dollars the Australian Government now spends on those biologic drugs. But they do turn people from being crippled back to normal and have a normal life. So they are actually great value, they've proven to work, but they're still not addressing the fundamental underlying cause of these things like severe rheumatoid arthritis.

So if we're going to discover the cause, where is it going to come from? It's going to come from a medical researcher who is - maybe he's studying a rabbit or a frog or something; he's looking at the immune system. And he doesn't know too much about rheumatoid arthritis; he's studying white cells, T cells, B cells and antibodies, and very fundamental things about the immune system in some obscure animal model. And he will come up or she will come up with a new advance, a new

discovery, and if that person's a lateral thinker they'll say, Wow, maybe… They'll do a Google search, perhaps, they'll find the same thing in the rheumatoid arthritis literature somewhere and then move over laterally. So it happens a lot easier these days, and bingo you've got a start up company and now you've got a cure.

Now, sad things about cures - they're cures because you only use them once, so you only make your sales of your drug once to each person. So, ultimately, we could get to that stage; it would be wonderful if it came from Australia and they had a good patent, because each time they sold it that would be worth $20,000 just for that one tablet.

So that - I think that is the future of medical research, but it has to be pumped up. And looking back in the history of NHMRC in medical research funding, I know in the '90s NHMRC funding was kind of - the plan was to double it and it's been doubled again since then, and I think we should be trying to double it once more. And same in the United States: they recognise the fact that people are moving out of research, the top brains are going and trying to do something else because they have to be - you know, they're 35 or 40 before they get their first independently-funded research lab. You want to get the people into research in their 20s when they're creative, their minds are not poisoned by all this dogma which could be correct. So in my case, I wasn't a gastroenterologist with - and Dr

Warren; we weren't ulcer specialists. So we were saying, Hey - maybe it's caused by bacteria.

So that is where the discovery for something new is going to come from. It's not going to be the person who's spent his whole life studying high blood pressure, high blood pressure patients and is now in his 45 - 45, he's a big professor. It's going to be someone in his lab or a related lab who just makes an incidental discovery.

So that's just to tell you why curiosity-driven research is what we should be funding, and we should be able to capture that creativity. We have a big advantage here in Australia at the moment - you know, it's one of the countries that didn't go into a recession two years ago. But I can tell you that it has been very painful for me and a lot of people in medical research, because in Australia you don't actually have that second string to your bow. In the United States if you're in a peer-reviewed research like NIH or NHMRC and you don't get - and you're not funded, well, then there is a bit of a vacuum out there in Australia. There's not a lot of biotech companies that you can actually move into to keep your team alive, if you like.

And philanthropy in Australia - it's picking up, but it's still not as advanced as it is in the United States. So in the US when you have a lean year on the peer-reviewed funding, you can look around and call up your mates in the pharmaceutical companies and maybe some of your patients will have, you

know, a few million, a lazy million floating around that they can help you out with. And that has been - you know, that's how I used to function when I was in the United States, but it's much, much harder to do in Australia. And each time something is not funded, well those people are answering job ads in the United States from around the world.

With the Aussie dollar high at the moment as well we are very competitive. And I have a very international team in Western Australia - Germany, Sweden, United States, people from all over, plus some expat Aussies coming back out of places like Switzerland where they were working for Novartis. Now they're back in Australia. So it is a time when we can take advantage of this brain drain, reverse it. And people really do love to come to Australia. And you'd be surprised at the number of people in my lab who first came to Australia as a backpacker, taking their year off between school and university, and so for the rest of their careers they always look at the job ads from Australia. They say, I know that's not the end of the earth and they do have the internet and cell phones now, so we can go there. So we're, you know, primed up, ready to go, I think, for medical research to be expanded.

Now, I mentioned earlier that - so, we talked about cures and longevity and disability, and where are we going to go now and in the future. And that brings me to genomics. The story with genomics - the reason I can talk about it this year is it's the tenth anniversary since they actually released the

first mature draft of the human genome. Now I was in the United States when the genome project was first devised, it was happening about 1990, and they said it's going to cost $3.5 billion. It's like the Manhattan project plus putting a man on the moon - we're going to sequence the human genome, $1 per base.

And they started working on it, and the problem was - arose, apparently, according to Craig Venter, because everyone was going to get $3 billion out of the NIH and it was going to run their labs for the next 10 years on the human genome project. So they're all, you know, giving themselves promotions and bonuses and things. And out of the blue Craig Venter says, Hey, I've got this great idea - shotgun sequencing - and I think we can sequence the human genome for only $300 million. And of course the scientific community said, Are you crazy? Keep your mouth shut. We're not going to support you.

So he went out and started a company Solera, and A - with some colleague - ABI. And so, while the, you know, official genome project was ticking over on a 10 year program, Venter started up and was, you know, going at an accelerated rate, exponentially sequencing the human genome. And then they had this big barney, and eventually President Clinton said; okay, no more patenting genomes, or something like that.

So that's the biography of Craig Venter.

So they ultimately sequenced the genome sooner than they thought, and it happened at about year 2000, but overall it still did cost about $3 billion by the time they polished it up and everything.

So after that, what's happened? What's the value out of that 3 billion?

Well now days, there's been a - an auditors report come out of the United States. They are making $70 billion a year on human genomics at this time.

Three-hundred and fifty-thousand people in the United States employed in genomics. There are, I - at least a hundred genomics companies. And its' supporting all kinds of other research, fundamental, basic research, genomics of different animals, stem-cell research, etcetera.

So the accumulated benefit in the United States from their genomic program which - did the human genome 10 years ago, is $675 billion, [break in transmission] I think it is at this stage. And it's still accelerating. And we are getting involved with it now. So a lot of these machines that do the human genome, they have to generate 300 gigabytes of data, because there's a lot of - they do it - make many copies of your genome and then they take the average, and then they kind of get the right base.

These machines use to cost, couple of million dollars, and it would cost a few million dollars to do

human genome or an animal genome and you'd have to get the labs all over the world, and they've now been decreasing, and they're heading towards the $1000 genome.

These machines now are approximately $500, 000. You can put them in your lab. And there's a new desktop one coming out now called an iron torrent, and it sits on your - on your bench, it's about the size of a big microwave oven. It's got a screen here; it's got a - iPhone charger on one side of it so you can plug your iPhone into the top of it. And it takes a chip which is like an Intel microprocessor.

So we know how to put 50 million, or 100 million transistors on a chip. That's just a bunch of robots somewhere in San Francisco is doing that now. And these chips, they can make them all kinds of different sizes. They can do bacterial genomes by the dozen in - at lunchtime, which is a thing that use to take six months and $10 million. Now it's down to about $1000 a hit.

So, you know, medical - bacterial microbiology research is going to go crazy over the next few years. And these things will do a human genome in a couple of weeks, so the price of a human genome right now, even in Australia is about $10,000. So, one of the things that we are doing in Western Australia, at the West Australian Genome Facility is sequencing some genomes.

Now in Australia we're still very paranoid about genomics and DNA; oh my goodness, it's so secret, etcetera, and I think it's got a bit out of control.

In Australia at the moment, there's free health care. So there's very little disadvantage in knowing what your DNA is, although there's - we are lacking - we're lagging behind in some aspects of the legislation, which I can discuss later.

But to - I can tell you the first person to do his genome - put it out there on the web, was Craig Venter. He was a bit shy about it for a few years. He wouldn't admit that it was actually his, because, there's a reason for that, but we'll talk about that later.

[Laughs] After him was James Watson, the person who actually won the - won the Nobel Prize for discovering this - the structure of DNA back in 1954. And I think they won the Nobel Prize 1962. So, coming up to their fiftieth anniversary.

Then recently, Bishop Tutu, he said he's going to be the first African public genome. You can probe his genome on the web now. And five African bushmen, Pygmy people from the - I forget which desert it is, they have totally been sequenced. And this year, they're going to do a thousand anonymous, but human, genomes and put that on the web.

So sort of information is just flowing out, so massively coming towards us for - for all - everybody to use. So what's the shortage going to be? It's not these little sequencing machines anymore. They're going to be dirt cheap. It's people to actually look at that data and analyse it and tell you what's in your genome, because - so what we should be doing now is funding lots and lots of scholarships and sending people in bioinformatics overseas to come back, or concentrating them in big sequencing labs, and focus on the difficult stuff; the human genomics, and the plant genomics that's going to revolutionise everything.

So genomics in the future is going to be like the industrial revolution. Then there was electricity, and then we had information technology in the twentieth century. Twenty-first century is going to be the genomics and then the biological revolution, and we're all going to be using it.

Now, right now - so, in Western Australia right now, we have the first two Australian public, personal genomes in the machine.

I've already got a little website. I can give you the link later, where you can actually see one million snips, which is the preliminary look at your genome, and that costs a few hundred dollars at the moment.

So my snips have been on there for a few years. But, as we speak, myself and a fellow in - in Perth who paid for it - a philanthropist - Charlie Morgan, who's a mining entrepreneur, oil entrepreneur, he funded the sequencing machines in the Western Australian facility. His DNA is in there. My DNA, I heard that they did another 20 giga bases of his read this morning. It's all ticking over. It's going to come out in about a month.

What will we do with it?

From there it goes to a super computer at Murdoch University - a $6 million super computer. It'll be in there and it's connected to the Cloud. So it's not even on the web anymore, it's one better - it's in the Cloud.

And you'll be able to access it, probably able to pull out your iPhone and you'd do the human genome app and you could look at and see whose genomes are on the web. You can connect yours up to it. You don't even need to know where it is anymore. You just open up your little software package. And there's folders on the right hand side with Bishop Tutu's genome, Barry Marshall, Craig Venter - anybody who wants to be there can - can kind of put there genome on the Cloud.

Now the people who do if first are going to get the most advantage because there'll be thousands of PHD students all over the world who'll say; I'm

going to do genomics. I heard Dr Marshall's lecture. This is the way to go. And I'm writing this little app for my iPhone. It puts Bishop Tutu - compares him to Dr Marshall, and what do you know, Dr Marshall's got sticky wax, or something like that, you know. That kind of thing.

So we, the first people who get involved will get hundreds of publications and will get that advantage, good and bad. So you have to be prepared for the fact that you might find something a bit unpleasant in your genome.

The fact is that we all have at least 200 serious mal… mutations in our genome that are new to us. So it doesn't matter too much because you - you're partnering with somebody who's not you so that they average out and they become silent. If they're very rare, it's never going to happen. But of course, if you're married to your sister, theoretically, you would then have two people - you would have children who have got both mutations and you would have what we know is consanguinity problems.

But ultimately the people who've made jokes about this, you can go into a singles bar and you turn on your iPhone app, and it's just checking around the bar, so before you start buying anyone drinks, you want to know that they're not closely related to you.

Or maybe - maybe you'll find that you've got a third cousin. So I actually, I know that there was a Marshall on the first fleet, but he was one of the guards, not one of the convicts.

So I'll give you a little bit of a run down of - of what you want to do - if you want to look at it and see what it's like, I - I have one on the web called deCODEme. And this is actually the highest rated one. It's rather expensive to get the whole lot. It's $2000 now for - for the whole works.

But this was based on the - Iceland. And they took all the medical records of 300,000 people in Iceland, and then they did a mouth swab on everybody and put their DNA in the machine. And so that - they said; well which gene, or which of those million snips that they tested - so it's only a tiny fragment at the moment of your whole genome. They said; which of those million snips correlates with diabetes?

So they just filter that - the database to pull out a thousand people with diabetes and then they run the statistics on the database and they say, okay, here's some genes that make you at risk of developing diabetes so therefore try not to eat too much, don't get fat, avoid sugar and try and get a bit more exercise because you've got a much higher chance of developing diabetes if you get older than not. So I can see - you can see that's a value there.

So on my - my one is quite interesting. It says, correctly, that I have blood group A, it says I've got a 20 per cent chance of male pattern baldness, nevertheless I'm still thinking about hair transplants I have to admit.

[Laughter]

Of concern - and I thought about it a bit - is the Alzheimer's disease gene, so I have twice the normal risk of that. And my lifetime risk is - my relative risk is 1.95, my lifetime risk is 11.7 per cent. So I can live with that. I think I'm an optimist. I think I'm in the 90 per cent and if I had any money I'd donate it to Alzheimer's research, wouldn't I. So I think we need to get all the baby boomers tested for that.

I don't have alcohol flush reaction so when I've had too many drinks I just look completely normal rather than having a red face.

I'm unlikely to be addicted to nicotine and in fact I was a light smoker but I could take it or leave it and I stopped smoking 20 years ago. I used to enjoy them though, I have to admit.

[Laughter]

I don't - so there's a few… there's another one here, macular degeneration. So in my family my grandmother had cataracts. When they removed her

cataracts they said the operation didn't work. So she had macular degeneration behind her cataracts of course. So that is a risk so I've got, like, a 20 per cent chance of developing macular degeneration if I live long enough.

So I'm interested in getting an ophthalmologist to check my eyes every year or two, and I'd be a bit more obsessional about that than if I didn't have that risk.

Now, the other part of that is that you can get great value out of knowing you don't have the risk. And my wife's mother has macular degeneration and she went legally blind about five years ago and, luckily, they came up with a new biologic drug which she has and now her eyesight is stable so she still lives in her own house, et cetera. And - so my wife had the genome scan and, what do you know, she does not carry the macular degeneration gene from her mother. So her mother cried when she found out that she had not passed the gene on to my wife. So that was her sort of a little joyous occasion for us in our genetic scan.

I'm trying to see - I haven't got any other interesting stuff in here. Anyway, you can go on my website at barryjmarshall.com and download it and it's on the cloud somewhere.

Oh, the other final one that I'll give you because I did mention about statin. So if I'm going to treat my

cholesterol, am I going to treat it? It's very borderline. I don't have very many risks. It's not all that elevated and some would say, well you know, you're better off just leaving it alone because statins give you this horrible muscle thing called statin induced myopathy. It can be quite dangerous and unpleasant and it happens in maybe - between one and three per cent of people on statin so why would you risk that if you feel fine. Well, look at my scan. I have a very low chance of statin induced myopathy so that means my cardiologist said, Barry, I'm going to go for it. I'm going to get you right down to the lowest of low cholesterols and you'll live forever. And I said, well okay, if I'm in the bottom 10 per cent I'm happy with that. But at least, I'm pretty safe I'm not going to get a statin induced myopathy and I'll take it a little bit more carefully and I'll take a slightly higher dose. Instead of just getting in the top of the normal range I'll be in the bottom of the normal range.

So - and so it goes on. And every time I go to a doctor for the rest of my life, after I've got my genome, it will be on my little USB. It will come down to three gigabytes once they correct and fix it up. My doctor will plug that in to his PC in his surgery. He'll look at it and every time he gives me a treatment - by the way my doctor is actually my daughter who is just graduating in medicine year.

[Laughter]

So it's important to have a doctor who is much younger than you.

[Laughter]

But she'll plug it in, look at the software, and she'll say the dose of statin or high blood pressure medicine is this, the best one for you is this one. And every time I have a medical consultation for the rest of my life I'll get value out of that genome on that card.

So it's not like you have to keep refreshing it. Every month these people will send me a new email with some kind of new advance and change the statistics a little bit, tweak it a little bit more. So I'm looking forward to actually taking part in this genomic revolution.

So why an I bringing this up with - just so you… when you print it out in Excel it's millions of little numbers but the software is easy to use.

So why an I telling you about this? Well, at the moment there's a bit of a closed shop in genetics in Australia and the people who have been running the genetics advisory counselling services are trying to keep it - be gatekeepers on this technology. And I think the Australian Government is happy to do that because, of course, as soon as they admit that there's value in it they have to pay for it. And the problem with that is it could cost a lot of money.

But very soon, five years from now, maybe 10 years from now, I think it's going to be part of your normal health care and everyone can then get a bit involved. Do I really have to give up eating lamingtons? There's a gene for that.

[Laughter]

And I would be very interested to know that I don't have it, but I suspect that I have.

So I'll leave it there.

The final message is medical research, curiosity-driven research, that's where we want to go. And this is a golden opportunity for Australia to do that. We've got all the things in place and I think we could be right up there.

Thanks very much.

[Applause]

LAURIE WILSON: Thank you very much Barry. Let me kick off questions before I move to our other media members.

Unfortunately for the last few days I've been suffering from a cold so I'll keep my distance. But you mentioned, when we were chatting earlier, that you're actually looking at - you're working on a cure

for the cold. It's something that people have talked about for a long time. Do you have any notion of how far away something like might be, whether it's you or some other researcher?

BARRY MARSHALL: Well, I have a company, Ondek, that's in the vaccine business and we're trying to make oral vaccines. So, ultimately vaccines that you could just take like a [indistinct] product or a yoghurt or maybe a little pill. The reason people have not been trying to make vaccines for the common cold is because colds change all the time so you'd have to have a new one every three months. And you know from the H1M1 flu, it was nearly a year before everyone could get a vaccine. So at the moment the lead time is a year. But with these new technologies - I'll give you a strategy. I put a scientist in all the - in the emergency room at the paediatric hospital who swabs every kid who comes in with a runny nose. And so we would know about a new cold virus within a week and then we put that into sequences. So by 10 days we've got the sequence of that cold virus. We say, that's a new one. We clone that into our bacterial vector and then it takes 12 weeks before we've got a tried and tested oral vaccine. So that is where we're going to be in 10 or 20 years. I don't know how long it's going to take. It's going to be new technology and it is quite difficult.

But we solved that problem with the cold. No matter how quickly it changes, technology these days you can track it. The example this week is the

E. Coli epidemic in Germany. I can bet you that that germ is also sequenced. They know exactly what it's like and they will be able to find the cow that is producing that bacteria because it actually a natural organism in cows. So I'm confident that they will track it down and that's - what is it, a week since that epidemic started. I bet you that within two weeks that genome is on the web and people will be able to say, hey, I've seen that one before, I've got that one in my computer and it comes from that particular farm.

So - I didn't talk about health surveillance but in Australia the public health authorities already do a lot of this because Australia is so large. We've got tropical areas and we've got temperate areas but, you know, Murray Valley Encephalitis. We get a bit of hot weather, we get a flood and mosquito population builds up in Queensland. What do you know? People are developing Dengue. People are coming back and forth from Australia to Bali and these different tropical countries so vaccines are something that we do well in Australia and we should continue to invest in.

But the future is that these big concerns like H1N1 flu are not going to be something that we have to worry about quite as much in the future.

LAURIE WILSON: Okay, I'll move to the floor now. Mark Metherell.

QUESTION: Mark Metherell from *The Sydney Morning Herald* and *The Age*, Professor.

To what extent do you think this could reduce health costs or will it merely give us another avenue for health spending without much in the way of savings for more focused treatment, and that sort of thing?

BARRY MARSHALL: Well, it's going to be health spending but that's you and me, mate [laughs]. We are on the receiving end of it. So if you haven't go your health, any other value you have in your life is devalued. In Australia, the funding agencies do try to work on a cost-effectiveness and cost benefit basis. So you can see some of the effort has to be in continuing monitoring of these advances to say when does it reach that point where the new technology come in and it should be funded.

So it's - if it's done on a cost-effectiveness basis it's going to work. So initially I expected these f… these new genomic tests be… they'll become available in Australia privately. Already I know lots of people do it. And it's - I think it's a great present for your partner at Christmas, some kind of genome scan, and everyone says oh my God, $1000 - or $500. I can tell you that half the kids in high school are walking around with iPods in their pocket worth that much.

So it, really, it's ball park for standard - for Australian life at the moment, that kind of spending.

So privately initially, but then obviously anyone with a familial disease or maybe diabetes, prostate cancer, and ulti… it can be taken to the nth degree, and the other thing that's being done right now is sequencing every single cancer of any importance in human kind.

I think they've got the top 100 cancers.

And they said we are going to sequence 100 cancers from 100 people, say, for lung cancer or breast cancer, and we're going to sequence the person that cancer came from. And we're going to compare them and see what the differences are. So you could see that very very powerful technology that we're going to be doing over the next 10 years.

And we're going to need a lot of trained people to actually figure out what those differences mean. But the value that comes out of it is that when you say you have a breast lump removed, you had the genome done on the lump. And they say good news. You don't have to have $20,000 of chemotherapy and your hair fall out and you'll be sick as anything for six months.

You've got the one that hardly ever spreads. And it's - the lumpectomy's all you need. So that is where the value is. You've got - given someone six months

of useful life back. And it's very easy to cost that out and put it back into the system. So it will give to - but the cost of it's coming down. So when the - when we have the thousand dollar genome we start thinking about cost effectiveness in maybe different groups.

When we give the $500 or $200 genome, everyone in Australia would have it done. I won't diverge too much but this sort of thing's been going on in the Amish community now, I saw a lecture about this, in Pennsylvania. So if you go to Pennsylvania, you see the Amish. But they - there are thousands of Amish people. But they are - they come from 23 or 24 families, 150 years ago, I think it was.

Now their g… they have a general practice especially set up for the Amish. They have a sequencing or they have a chip machine in there and every person, every new baby gets sequenced on day one, not a whole genome, but the snip chip. And everyone in the whole community has been sequenced. So there's - they are concerned about consanguinity. And there are various hereditary defects running around in that community.

But they're going to wipe them out because they will actually all be sequenced and all have access to their genomic information. So there's a very very bright future for it.

LAURIE WILSON: Next question Judith Ireland.

QUESTION: Thanks Professor Marshall. It's Judith Ireland from *The Canberra Times*. You note that fear of genetic disease is a big factor, a big constrainer in debates about genomics. I was just wondering what kind of support or counselling people might need in the community given that we're going to have so much information about our genetic make up and our health [indistinct] .

BARRY MARSHALL: So - that's a good question. There is going… there is a shortage of that kind of counselling so if people need to be able to access it I can tell you now that on the deCODEme website you just have to send in an email and they will send you their 800 number. And you can get on the phone and talk to one of their councillors who are certified in different ways.

When they first started up they were going well. And then a year or so ago the rules in the United States were that you had to be a medical practitioner to council people. So they had to close down the genetic testing services. But now one by one the States have put in a bit of regulation as to who's going to be qualified to give genetic counselling like that.

And they've raised it up with those provisos as becoming legal again in each state. I don't know whether it's legal yet in California.

So obviously you can actually pick up a lot of this information if you want to off the web. And it might

be specific to the - your testing. And I think in the future there'll be a lot of people who have a certification in genetic counselling, but it's a choice of the person involved whether they want to have it or not.

While it's, while you have to pay for it I think that abrogates the establishment and the government from having to supply you with genetic counselling if you choose to go and get it and pay hundreds of dollars for it, obviously, you should be prepared then to go and get genetic counselling as well.

There are - the other side of it is more for the pathology and hereditary defects, particularly young children in paediatric hospitals where there are genetic counsellors. And people will then make the choice of whether or not they want to find out if they themselves have the Huntington's chorea gene for example. The advantages of finding that out is that you can then start monitoring the literature. You can then volunteer to take part in clinical trials, there are new treatments, viral therapies, genetic therapies coming up on the horizon which might give you some hope that you can get another five or 10 years if you even did have Huntington's chorea, for example.

So it seems to me even at this stage there are disadvantages in not knowing if it would be important.

The other, the big value of knowing and finding out - and you find out if you have a gene, a recessive gene, the best example might be muscular dystrophy - and so that you could then avail yourself of say pre-implantation genetic diagnosis. And you could have embryo screened and choose the one that's not carrying the muscular dystrophy gene.

And now muscular people with muscular dystrophy, women who are carriers, would choose not to have a family right now.

Or they might choose to miscarry male children - whereas it's much nicer to do that in the embryo stage and just implant the female one or the one that's not a carrier. And that can be done now.

That thing's going to be a very very big business that's really going to be booming, it's already starting up I know in the United States. And you can pay for this kind of stuff, I'm not sure how up to date we are in Australia. But potentially that is going to be a new booming industry. And diseases like muscular dystrophy, cystic fibrosis, potentially will be wiped out.

They don't need to exist anymore in Australia.

LAURIE WILSON: I just make one point too, I mean in terms of Huntington's which I know a little bit about, one of the issues is of course if you do know and you have

children, I mean if you don't know but you know it's hereditary in the family, you really should be telling your children and finding out for their sake it seems to me. Which is an issue that's arisen in terms of some distant family relatives of mine.

BARRY MARSHALL: Well I've met the two very big, very important spokespeople for Huntington's chorea who've actually got it, and one is a woman who, she won the Lasker prize in 1995, Peter Doherty and I were in that intake, and the lady who, she went to Columbia, and found these, the tribe down there who has a lot of Huntington's, and she helped work out that gene.

She, since then, she's disabled now, and she's off the scene because she did have, develop full blown Huntington's. But 10 years ago she really made a mark by getting off her backside and getting out there and actually finding it and saying yeah, I'm one of you guys.

Let's do it.

And recently a fellow who was actually a big CNN reporter, he was in the Middle East wars, very well known, has Huntington's, and he's a spokesperson for Huntington's chorea. He does MCs and after dinner speeches, et cetera, in Canada. And he's, you know, he's got a ticking time bomb inside him. And he'll go off the scene I suppose in the next few years.

But there are some advances for genetic therapies. And there, I know there are people who think they've got things that can help patients with Huntington's. So you've just got to be focused on and put the money into it.

LAURIE WILSON: Andrew Tillet.

QUESTION: Andrew Tillet, *The West Australian* newspaper, Professor. Just following on from your last answer, how do we, as a society, deal with the ethical dilemmas of when we find out - if everyone's going to have their own genes mapped, if we find out that we have recessive genes, you know, the ethical questions, like do we have children - things like that.

BARRY MARSHALL: You're going to make your own informed choice. So we are going to develop an industry of people who will be there to inform you. So you might pay, you know, $100 to do something by mail order or you might go in to the pharmacy. And there might be a pharmacy chain that's got a genetic person that turns up there on Thursdays. And you can sit down and have a consultation, and you pay $30 or it's on HBF or something like that. So you would have the latest information.

You can also update it on the web. You can find - there's numerous blogs. You can talk to hundreds of other people around the world who've got the same

thing that you've got, if you want to, and make your own decisions.

So I think it's always better to know because then, if there's a possibility of doing something about it, you can take advantage of it.

So this has been a big problem with genetic information, this concern about secrecy and how you might be disadvantaged. And I know when you do life insurance or some kind of insurance policy, down the bottom is - you check this little box, I don't know of any other adverse health information that I might have, which might prejudice my survival or health in the future. You've kind of got to check that box, if there's anything that you didn't tell them about.

In the United States, they have legislation. It was one of the final things that George Bush did. It's called the GINA - Genetic Information Nondiscrimination Act. In the United States, it is absolutely illegal for a health insurance company to ask you if you've got any secret genetic information that they need to know about that's going to tell them that next week, you're going to be crippled and cost them $1 million. They're not allowed to ask you for that, they're not allowed to ask you to do a test and they're not allowed to ask you if you know about it. But they can ask you does anyone in your family have hereditary diseases where you all fall over at age 60 and become disabled? They can ask you that. And if you had Huntington's chorea,

and you had your physical examination and, now and again, you were twitching, the doctor could say, I think he's got Huntington's chorea, therefore we're not going to insure that part of your health insurance. They can do that. But they can't actually perform a genetic test and find that you have a risk of Huntington's chorea and then put a loading on you or refuse to insure you.

In Australia, obviously, you'd have free insurance, anyway. You'd go to the top public hospital and see the top specialist. So, you know, I'm making my public genome - putting my genome out there. And someone will eventually say, Barry, I think that you've got X, Y or Z, you'd better be careful, you'd better not eat peanuts and shellfish in the same dinner or something. You know, that kind of thing will come out. But I'm not really worried that I'll be crippled and my family is going to be looking after me at home with a private nurse. I think in Australia, we're not worried about stuff like that. So there's a big advantage in Australia's - Australians can really get the benefits, without so many of the risks.

Now, I can see though that someone, before there's any matching legislation in Australia - and I could be educated on this, because I've heard that in Australia, we already have that, but I don't believe it. Until I actually see it in black and white, and hear about it, I don't believe it.

People could say to me, Barry, we've looked at your genome and we don't think you're a good insurance risk. I can live with that, you know? It's not going to be - I don't carry life insurance. My kids are grown up. They seem to have jobs. So I don't have a lot of dependency at the moment. And if I develop Alzheimer's disease, well, that's bad luck, but it's not going to worry me.

LAURIE WILSON: Our next question from Ken Randall.

QUESTION: Professor, Ken Randall from Media Monitors. Going right back to the beginning of your address today, to encourage long term thinking among public policy makers is getting tougher and tougher. I mean, if you look at the state we've reached in the debate on climate change, it's so short term-ist that it must discourage some of your colleagues from trying to encourage people to think long term about medical research. Have you got a response to that?

BARRY MARSHALL: There's different ways of looking at it. You know, the question that I see that is not front and centre is how much money do you spend now to protect yourself from something in the future? So it's really just like life insurance or an insurance policy. And maybe we're the first generation ever that's had that long term view. And how long term - you know, how efficient are we at making those predictions, long term?

So there's two sides to this long term view. And, obviously, if you're going to put all your money into medical research, something else doesn't happen - you're sacrificing road safety and thousands of people are getting killed because they went to sleep driving along in speedy cars or something or smoking cigarettes - all those other things. So you do have to find the right balance.

The thing about medical research is that I'm often having this discussion in Western Australia with the Government. I'm saying we need more money here, here and here. And then the bureaucrats will say, well, that sounds like a great idea, Dr Marshall, but we've got to present that to Treasury and convince them that if they put in ten bucks, they're going to get out at least ten or maybe fifty. There's some number, and it's actually 3X or 5X, that they look for before they'll see, okay, we'll bump that up to the top of the priorities and we'll fund it.

However, one of the things that is not measured, and, really, we have to start looking at this - it's more advanced in the UK - is the social impact of these advances, of medical research. And my lowest common denominator for social impact and trying to get an understanding of this is the fact that I am a patron of the Fremantle Hospital Medical Research Foundation. So I have to barrack for the Dockers. Now, the Dockers have never won a premiership. And we go along to the games and we have a hell of a good time barracking for the Dockers. And, you know, we're over the moon when they beat the

Eagles, every now and again, at the derby. And they've got about a 50 per cent hit rate at beating the Eagles, and that's fabulous. And we'll still read about the Dockers and go along to the games and support them. And so even if they never win a premiership, we are getting value out of the Dockers every single day.

And I think that the Australian community now is very educated. And you know how much media there is about science and health and science in school, the Adventure Channel, National Geographic - all those things. That is value you get that's not monetary, a social impact.

The second thing is all this medical research we hear about is great at educating the whole population. And it's very, very easy to introduce new health advances and public health programmes to people who are actually tuned in to medical research and who understand it a little bit better. And so, you save that money there.

But I'm not going to say that every single invention in a lab in Australia is going to translate into dollars and a big patent and, you know, stock market extravaganza.

LAURIE WILSON: It sounds like there might be a case for a bit of genetic selection when it comes to the Dockers. Mark Metherell.

QUESTION: I was fascinated when you mentioned the possibility that people - young people in a bar might somehow be able to, on their iPhones, find out the genetic status of their prospective interlocutor. But is that actually possible? I mean, I can believe it's possible when you look at the way Facebook has generated this incredible new indiscretion among people, which I don't understand because I come from a pre-computer era. But is it technically possible that people…

BARRY MARSHALL: It's already there.

QUESTION: …people could - but they don't know who the other person is, though, or do they have to ask what their Y chromosome is or what?

BARRY MARSHALL: Finish your question, and I'll tell you.

QUESTION: I'll finish my question.

BARRY MARSHALL: Okay. So when I go onto my website - so, as I said, for the rest of my life, I have a website on deCODEme and I can see the new stuff. So I can actually study my mother's genealogy, way back. So the Marshalls, if you want to know - they tend to come from north east England. And they're descended from a king called Sommerlad, who's got almost as many descendents apparently as Genghis Khan, who has 12 million. Sommerlad's got about half a million. He was a Viking, about the year

1000 and lived up in Edinburgh way. So there's that kind of thing you get out of it.

But there's a link on here. You can add it to your Facebook page. So I only have to do a couple of clicks on my genome page and it's now on my Facebook page. So people on Facebook who do the same thing can do a comparison, go to mine. You can share your genome on Facebook or on this. You can go into a 3D browser, where you've got people all over the world who've got their genomes shared and you can rotate them around. And the public ones have got their names on them, so you can see James Watson and Craig Venter, Bishop Tutu, ultimately Barry Marshall, whatever, and see how close you are there.

An interesting one was my father-in-law, who is Jewish. And his parents came from Palestine in 1890 or so. And he was an accountant, a kind of MBA-type bookkeeper for the Repat Department, so he's pretty good on mathematics. He's 98 at the moment. And he is a smidgeon separated from James Watson, who's also Jewish, who is, as I said, the other - the second public genome. So it's fun to look around like that. So his parents probably lived down the street from James Watson's grandma or somebody.

So there's a lot of value just talking about it at the dinner table with different people. And you'll get more value out of it, as time goes on.

LAURIE WILSON: I'll take a final question from Andrew Tillet.

QUESTION: Professor, you obviously made your name as someone who challenged the scientific accepted wisdom of the time. I was wondering what your opinion is on the climate change debate, where we have this consensus, a scientific consensus, that human-induced climate change is real but there is this growing scepticism and challenging of the science.

BARRY MARSHALL: I'm going to avoid that question because it's too much of a hot topic at the moment. However, it seems to me that if we delayed the carbon tax by one month, we could double the NHMRC budget on the money we saved.

LAURIE WILSON: I think we might conclude on that note. You've just had a [laughs]…

[Audience applause]

LAURIE WILSON: Thank you very much, Barry Marshall. As I said, I think you were last here in 2006. A great pleasure to have you back.

When I was doing a little research for this, I came across an article which said Barry's back, he's burned out, mellowed and glad to have some time just to hang out, after ten frenzied years in the United States limelight. That was back in 1997. So,

14 years on, I'm glad to see you're still mellow, but no longer burned out. Congratulations.

[Audience applause]

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