



The Plasticity of Longevity: Interview with Dr. James Vaupel

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ROTHENBERG: Welcome to another program of SAGE Crossroads, a program of the Alliance for Aging Research and the American Association for the Advancement of Science.

I am Stuart Rothenberg, a columnist for *Roll Call* newspaper and a CNN political analyst. Welcome to today's edition. My guest is Dr. James Vaupel, director of the Max Planck Institute for Demographic Research, a senior research scientist at Duke University, and a member of the U.S. National Academy of Sciences.

Jim, welcome so much to the program—

VAUPEL: Thank you.

ROTHENBERG: —SAGE Crossroads.

Well, our topic today is plasticity of longevity. Give me a one-sentence sound bite. What does that mean to the average person? What would that be?

VAUPEL: What it means is the following: It used to be thought that there was nothing that could be done about aging, and that there was nothing that could be done to extend the length of life for humans.

But now we know that there is a lot that can be done about aging, and that people can live much longer than they used to live. So that's the plasticity of longevity.

ROTHENBERG: How long have people been writing and talking about this whole subject?

VAUPEL: Well, Aristotle—everything goes back to Aristotle. Aristotle, in 350 B.C., wrote an essay in which he said that there were two kinds of death. Some people die prematurely. Other people die from old age. And that everybody's born with a maximum

life span. That when you get close to your innate, inborn maximum life span, then you die of senescence, you die of old age, and nothing can be done about this.

This idea from Aristotle, 350 B.C., all the way up until about twenty years ago, was the prevailing view among almost everyone, that nothing could be done to extend the span of life and very little could be done about aging.

In fact, Leonard Hayflick, who is one of the great gerontologists, one of the pioneers of gerontology, has said, “There is one and only one cause of death at older ages, and that’s old age. Nothing can be done about old age.”

That was the prevailing view.

ROTHENBERG: Now, it seems to me, I’ve been looking at a lot of your writings and you have spoken before a number of impressive audiences. It seems to me that when you get down to the nitty-gritty on the science, the big question is, is there a limit to life expectancy?

VAUPEL: Yeah.

ROTHENBERG: And your view is that there is a limit but it has been changing, or is it that there is no limit? What?

VAUPEL: Yeah, yeah. So the question is—there are two questions, actually. One is, is there a limit to life expectancy, which is the average length of life that people attain—the average life span?

Then the second question is, is there a limit to the maximum number of years that a human can live?

My feeling is that at any particular time and any particular environment, given any particular level of knowledge, it is unlikely that people can live past the time that that knowledge would allow them to live.

But as we learn more about health, as we learn more about aging, people have been living longer and longer. So I see people living longer and longer in the future. I’m not sure how much longer people can live, but there has been a steady increase in longevity in the past.

So let me give you a concrete example.

ROTHENBERG: OK.

VAUPEL: In 1840, Swedish women enjoyed the world’s longest life expectancy. And in 1840, Swedish women lived, on average, forty-five years.

Last year Japanese women had the world's longest life expectancy, and last year Japanese women lived 85.33 years. So eighty-five years four months.

So from 1840 to now, a 160 year time period, life expectancy has gone up from forty-five to more than eighty-five. So 40 years over 160 years—two and a half years per decade, three months per year. It's been steady, linear, just a steady rise and no sign of any deceleration, no sign of any slowing down.

So the evidence suggests that this trend will probably continue, and if it continues then people will live longer and longer in the future.

ROTHENBERG: But, but is there, as a scientist, can you project out, given the current rate, past rates, the current rate into a future rate, and assume that we will have the same time, same kinds of gains every year, every decade, every century?

VAUPEL: Yeah. Of course, there is a lot of uncertainty about this, and there's a number of downside factors, so that—there could be new epidemics like AIDS, even worse than AIDS, that kill lots of people.

There could be nuclear terrorism. There could be war. There could be famine. There could be economic collapse. I mean, there are lots of negative scenarios.

On the other hand, there are also some very positive scenarios. The biomedical research scientists are beginning to understand the underlying processes of aging. We are, for the first time, beginning to actually understand what causes Alzheimer's disease, for example. We are beginning to understand what causes heart disease at older ages, what causes cancer.

So, on the upside, it's possible that there could be major breakthroughs that enable people to live a lot longer within a few decades.

So my view is that if life expectancy has been going up by two and a half years for decades for 160 years, it's likely to continue to go up by something like that in the future—maybe a little bit less, maybe a little bit more—but something like that.

What that means is the following: That life expectancy is a measure of current conditions. It is not a prediction about how long somebody will live. But it's a measure of how long a person, a baby would live if that baby was confined to this year, could not get out of this year, was stuck with the conditions of this year.

So a more meaningful projection for most people would be, how long do we think that a newborn would live given mortality improvements?

The result is quite astounding. The result is that a newborn baby, in the developed world today—Europe, Japan, the United States—of those newborn babies, half will probably celebrate their hundredth birthday.

ROTHENBERG: That's amazing.

Now, one of the things I've found really interesting was, you hear a lot about nutrition at a very young age, and taking care of younger kids, and that will make for a healthier adult.

But you have noted that significant changes in life span occurred maybe in the—up to 1950—because of lower mortality rates.

VAUPEL: Um-hmm.

ROTHENBERG: But since then we can actually extend periods—people's lives—at significantly older ages. Is that right?

VAUPEL: That's right. Yeah.

ROTHENBERG: Is that a fundamental shift in the way we look at plasticity of longevity?

VAUPEL: You know—absolutely. It is a very fundamental shift. The increase in human life expectancy from 1840 to 1950 was entirely, almost entirely, due to progress in bringing death rates down at younger ages. So infant mortality came down enormously.

Two hundred years ago about a quarter of infants died before they celebrated their first birthday.

ROTHENBERG: If you survived that first birthday you're—

VAUPEL: Then you were in good shape. But still—I mean, a 25 percent infant mortality rate. Today, the infant mortality rate is a few per thousand. I mean, it's enormous progress.

But childhood death rates, early adult death rates, tuberculosis, infectious—various kinds of other infectious diseases were brought way down, influenza.

So the progress was largely due to saving lives below age sixty-five, especially children.

But after 1950 the improvements to life expectancy have largely been due to saving lives after age sixty-five, to this extension of life, to this giving—adding years to the life of older people.

So it's been a remarkable shift, and the shift has been due to the fact that since 1950 we've had various kinds of interventions that could help save people from heart disease, that could intervene with various infectious diseases that were killing very old people, so the antibiotics and so on helped older people a lot.

And, as I noted before, up until now we haven't made very much progress against cancer, but scientists are beginning to understand the mechanisms behind cancer and how to prevent them, and how to cure it. We also are beginning to understand dementia in general and Alzheimer's disease in particular, and may be able to make progress in the future against those, which are major causes of disability and death for older people.

ROTHENBERG: Can you talk about your German study? I found that particularly interesting as an example of how environmental factors can change, among even significantly older populations.

VAUPEL: Yeah. No. Quite a few people believe that events early in life determine how long a person is going to live. There is a school of thought that events in utero, before you were born have a major effect on you, because events in utero, your nutrition in utero, your mother's health when you are in utero, determine the developmental process.

ROTHENBERG: You don't deny that they are important.

VAUPEL: No, no. This is important.

ROTHENBERG: Sure.

VAUPEL: This is important. Diseases early in life also can affect you. So if you have a severe infectious disease early in life that might damage your heart or might damage your liver, whatever, and that could affect your longevity.

So the question, the empirical question is, we know that events early in life are important, but how important are they compared with events late in life?

A lot of research recently has been focused on this. The study you referred to, I think, is a particularly interesting study. There was a kind of natural experiment that was done when East Germany reunified with West Germany in 1990.

Before 1990 East German death rates were much higher than West German death rates. Life expectancy was much lower. People who were elderly in East Germany, eighty-year-old people, ninety-year-old people had suffered forty, fifty years of communist rule after all the years of fascist rule before—you know, the World War II and so forth.

So these people had gone through very tough lives—but following reunification, death rates, even at the highest stages, death rates among eighty-, eighty-five-, ninety-, ninety-five-year-old people in East Germany fell very quickly to West German levels. And the West German levels were as good as any levels in the world.

So what that means is that it is never too late. That even very old people can benefit from health improvements.

ROTHENBERG: Now, this is—your whole approach is very optimistic about life span, and the future technology. Everything's going to kind of improve our outlook.

There is another school that argues directly contrary—that says that life spans are going to drop—do they go that far?

VAUPEL: Um-hmm. Yes.

ROTHENBERG: Is there a fundamental difference in approach for these two views? I know you are right and they are wrong, you would say. But is there some overall, overarching assumption that you differ with them on?

VAUPEL: Yes. It's absolutely true that there—it used to be the case that almost all gerontologists, almost all demographers, almost all epidemiologists and so on, thought that we were close to a limit to how long people could live—that we were approaching a looming limit to life expectancy.

As I mentioned, this view was prevalent up through the 1980s. And there are still people—that view is now no longer the majority view. That's not the minority view. But there's still large numbers of people who ascribe to that position.

It's difficult for me to understand how they can continue to ascribe to this position given the evidence. But I think I can give you one or two explanations.

First, the view that we are close to a looming limit to life expectancy, the view that there's a maximum life span and people can't live past this maximum life span—this is a, as I said before, this view goes back to Aristotle, and this view was supported by scholars from Aristotle all the way up to the 1980s. So there is a lot of precedent. There is a lot of weight of tradition and authority behind this view.

It's difficult for people to change their minds. Even distinguished scientists have a hard time changing their minds. Max Weber is alleged to have said that science proceeds funeral by funeral.

So there is some momentum or difficulty of accepting a new perspective.

But I think there's some—to give the other side credit—that there are two important reasons that they have, two important arguments that they have.

First, it is clear that there are some negative threats to life expectancy. As I mentioned before, AIDS has killed a lot of people. There may be infectious diseases, the avian flu for example, and other infectious diseases we don't even know about yet, that could kill millions, tens of millions, hundreds of millions of people, and we may not have antibiotics that are good enough to fight these new infectious diseases. That's true.

Secondly, there are grave dangers to the world in terms of war, in terms of terrorism, in terms of biological warfare or terrorism, chemical, atomic.

And there's—some people think that the economies of the western world are about to collapse for various reasons—that there could be a depression coming. There could be environmental collapses. There are very serious negative scenarios about what's going to happen with global warming and so on.

ROTHENBERG: Sure.

VAUPEL: So there are lots of negative downside things, and they—and so the pessimists may be right about these things. I don't deny that there's a possibility they may be right.

Another reason why you can't dismiss these people out of hand, is the following: suppose you or I wanted to live a long time. And I'm projecting that newborn babies today would live to one hundred.

ROTHENBERG: Uh-huh.

VAUPEL: Suppose you wanted to live to a hundred or I wanted to live to a hundred. How could we do it? What can you do? There is actually very little that an individual can do to extend an individual's life span by twenty years.

ROTHENBERG: Well, couldn't you avoid risk? Maybe that means not driving in a car, not smoking cigarettes.

VAUPEL: Yeah, yeah, yeah.

ROTHENBERG: Eating well? Or aren't there ways to minimize risk? Not...

VAUPEL: That's right. You can not drive when you are drunk, or not drive at all. You can drink moderately. You can get good diets.

ROTHENBERG: One glass of red wine a day.

VAUPEL: Yeah, one glass of red wine—or two, maybe. You can put a smoke detector in your house. You can wear a coat when it's cold.

So, basically, you can do what your mother told you to do, right? That's what we've learned from lots of studies—that if you want to live longer, do what your mother told you to do, and maybe you will live five or ten years longer than average.

But it's very, very hard to figure out any strategy to live to a hundred. It is still a—only about two people in a hundred live to a hundred. It's very hard to—they are basically lucky, these people, or they have some special genes, or some special behavior that we don't understand yet.

So when I'm criticized for saying that newborn babies will live to a hundred, I think the most powerful criticism is that I can't describe how they are going to live to a hundred. What's going to happen that will let them live to a hundred?

Then what I say is that I think heart disease death rates are going to come down. I don't know exactly how. I think we are going to find a cure or a way of preventing Alzheimer's, but I don't know exactly how. I think we are going to find ways of preventing or treating cancer, but I don't know exactly how.

So there are a lot of uncertainties about how this is going to be done. Basically, what I'm saying is that if life expectancy has gone up by two and a half years per decade for 160 years, it is likely to continue to go up. We are learning a lot about biomedical interventions, by health interventions. But I can't describe the details.

ROTHENBERG: So you are talking about medical interventions and technologies that are going to contribute to our ability to expand life span and ultimately, life expectancy.

VAUPEL: That's right.

ROTHENBERG: And as you say it has—we've seen it work so far. But is there not some wall up against which you can't get past? I mean, if we looked at sprinters and what the record was for the mile, or—you could say, "Well, we've expanded so far we are going to get to zero seconds to running a mile." There is some wall there.

VAUPEL: (Inaudible)

ROTHENBERG: Do we have—do you have any idea where the wall might be?

VAUPEL: Yeah. You know, that's a powerful and misleading analogy. Longevity is not like running. There are biophysical limits to how fast a human can run. I mean, we are a kind of machine and this machine can only operate in a certain way, and so that we will never run a mile in ten seconds. Never.

But longevity is different, and longevity is not like—I mean, longevity in some ways, is like a marathon. You have to live a long time.

ROTHENBERG: Right.

VAUPEL: But longevity does not have these fundamental biophysical constraints on it like running. And longevity is different. Let me try to describe this.

There's no reason—our bodies or the nature of our lives or our life courses is shaped by evolution. There is no reason that evolution should impose a maximum life span on humans. There is no reason that evolution should impose a maximum life span on any species.

Evolution is concerned about reproduction and the survival of offspring until they reach reproductive age. Evolution doesn't really care about putting a limit to life span.

Beyond that theoretical argument that—we've done lots of studies—me and various other groups have done lots of studies of various kinds of animals—not just humans but various kinds of animals. There is no evidence from any animal species that there is some biological innate inborn genetic limit to life span.

ROTHENBERG: Do all species age?

VAUPEL: No! It used to be thought that all species aged. That's not true. I've done some recent work that has shown that it is not true. It turns out that—it's a good complicated question!

It depends on what you mean by aging. So if by aging, what you mean is that mortality has going up, you know, your chance of death is going up—

ROTHENBERG: Right.

VAUPEL: If you mean that fertility is going down, that you have fewer and fewer offspring, or—and if you mean that morbidity or disability is going up—if that's what you mean by aging—then there are species that don't age, in the sense that their mortality goes down instead of going up with age, and their fertility goes up instead of going down with age.

To take a simple example—many trees fall in this category—an oak tree, for example. As an oak tree gets older it gets stronger. Its chance of death goes down. Its fertility of acorns it produces goes up. And—but not just oak trees. Many other species in the—particularly in the plant kingdom, but also some animal species show what I call negative senescence.

A variety of other species show no senescence at all. That their fertility stays the same and their mortality stays the same. So different kinds of fish seem to exhibit this, different kinds of turtles, little—some microscopic creatures called hydra and some little worms appear to be in this category.

So aging is not universal in that sense.

ROTHENBERG: So you would say that there is no—some sort of—no natural age limit for human beings.

VAUPEL: Yes.

ROTHENBERG: That there is obviously a biological component, DNA, but there is also all these environmental components.

Anything that we can do—we hear some people say, “Well, I wouldn’t want to live all that long. It’s unnatural to live to 110,” or something.

Your view would be that that’s not the case at all. There’s nothing unnatural about it, as long as you have normal interventions.

VAUPEL: Yeah. It’s not unnatural. When the life expectancy is not going to jump from its current level to a level of 150 or 200 tomorrow. It’ll take a very, very long time.

Life expectancy will only be increased because of better science and better medicine and better knowledge of the aging process.

But—and there may be some limit out there some place. I just don’t know where it would be. There is just nothing unnatural about it.

But the reason people don’t want to live to 110 is because they don’t want to live a long time unhealthy. And so that’s the really key question—can longevity be extended and the healthy span of life also extended?

And—and—

ROTHENBERG: And you think the answer to that is yes? Or probably? Or almost certainly?

VAUPEL: Yeah. Yeah. I would say it is almost certainly the case that if we live longer in the future, which I think we will, the reason we will be living longer is because we are living longer healthier.

Because it’s hard to live longer if you are sick. It’s—

ROTHENBERG: Right.

VAUPEL: So the way that life is going to be extended is to prevent various kinds of diseases that debilitate people before death. So—

ROTHENBERG: Can you also give us some idea—you talk about the kind of late-in-life changes that can affect life span: caloric control, or whatever. What are we talking about? What kind of interventions are we talking about?

VAUPEL: Well, once again, the—it’s very hard. There is a lot of very interesting research going on, and caloric restriction is one line of research. It’s been demonstrated in various animal species that caloric restriction extends life spans. It’s not been demonstrated in humans. We are different from mice and rats. It’s not clear—and it certainly—

ROTHENBERG: Some of us are!

VAUPEL: Some of us are! We are certainly different from fruit flies and worms. So it's not clear it's going to translate to humans. Maybe. More work needs to be done.

It seems to me that, as I said before, that we're right now at this very exciting period where it appears that breakthroughs might be made in various areas in terms of heart disease, in terms of Alzheimer's, that there may be interventions like caloric restriction that are very helpful.

Genetic medicine is beginning to become important and it may be possible if you have the wrong gene, to take some pill that produces the right protein for you.

Rejuvenation medicine is beginning to—and regenerative medicine is beginning to take off, so that there are now some interventions, that if you have a myocardial infarction and a heart attack, cells can be taken from your bone marrow and injected into your heart, and these cells help regenerate blood vessels in the tissue in the heart.

So there are some very promising interventions that are on the horizon. But it's not exactly clear what is going to work and what's not going to work.

ROTHENBERG: Is there evidence, is there research or—it would seem logical to me, but logic doesn't always hold—that as you age it's not simply one—you are not vulnerable in one area of your life or one part of your body, but there is—there is overall vulnerable—mutations or whatever.

Is there—or do people say, “Well, sure, we can cure here but if we keep you longer, there are going to be other parts of your body that are going to start to fail. Other things are going to go wrong.”

VAUPEL: Yes.

ROTHENBERG: Has there been research done on that?

VAUPEL: This is a very good question, and there has been a lot of research on this. It's absolutely true that most very old people—people in their nineties or centenarians, are suffering from several different disabilities and diseases. So that if—when a very old person dies, it's sometimes very hard to tell what the person died from, because the person is very old and is sick with many things. I mean, has a weak heart, may be suffering from some kind of dementia, maybe has severe arthritis, can't walk very well, can't hear very well, can't see very well.

I mean, there is no question about the fact that for humans aging is very important, and that older people suffer from disabilities and diseases. Many.

The—but then the deeper question is if we can ameliorate or reduce the cause—some cause of death—is that just going to be negated by all these other syndromes? Or is there

some sort of synergistic effect so that if you are healthy—if your liver is healthier, your heart is also healthier. If your heart's healthy, your kidney is also healthier.

It appears to be the second situation, that the different sources of weakness interact with each other and build on each other, so that if you can improve the functioning of someone's heart, you will slow the aging of the person's kidneys. And if you can improve the function of the person's kidneys, you will slow the aging of the person's brain.

ROTHENBERG: We haven't even gotten to this whole area, and we won't, of to what extent your mental health somehow was reflected in your physical health. But—

OK, let's kind of segue over to the era of public policy. We are not there yet. I want to talk about the political implications, what this means for governments and the taxpayers and the like.

In a number of your pieces you compare U.S. life expectancy to life expectancy in other countries. And you note, and it surprised me—probably surprised other Americans—we think that we are, you know, the wealthiest, the smartest, the healthiest, that we are lagging behind—

VAUPEL: Yes.

ROTHENBERG: —other countries in terms of life expectancy. Where do we fit in with the rest of the world? Why aren't we number one? What has happened?

VAUPEL: The United States was almost number one in 1950, it turns out, but since 1950 we have fallen behind other—the rest of the developed world.

And why?

Well, there are several reasons. First of all, life expectancy in the United States is brought down by high levels of early death. So the United States still has high levels of infant mortality compared with Japan or Sweden, twice as high.

The United States has high levels of mortality among twenty-year-old men, for various reasons: violence, murder, and so on, car accidents.

ROTHENBERG: Right.

VAUPEL: The United States has high levels of mortality, all the way up to the age of sixty-five among people who don't have health insurance. This is really a major problem and it leads to early death.

So the United States ranks at the bottom of the developed countries of the world in terms of probability of death before age sixty-five, at the absolute bottom.

Now, after age sixty-five the United States is much better. The United States ranks in the middle of the rich countries in terms of life expectancy after age sixty-five. So we are not doing the worst. We are not doing the best, either.

ROTHENBERG: Right.

VAUPEL: We are doing substantially worse than Sweden or Japan or France, after age sixty-five. And we don't know why. It's a real puzzle. Some of my colleagues and I are looking into this.

The United States—as I said before, we were very close to being the world's leader in life expectancy at birth in 1950. Up until about from—after 1950, we still maintained a very good position in terms of life expectancy at age sixty-five. All the way up until about 1990 we were close to being the world's leader, and maybe the world's leader in terms of life expectancy at sixty-five. So it's basically since 1990 that we have fallen behind other countries in terms of old-age life expectancy.

ROTHENBERG: And is it that we have slowed in our—improving life span?

VAUPEL: Exactly. What's happened is in terms of remaining life years at sixty-five, since 1970 or 1980, the United States has been more or less flat—a little bit of improvement but more or less flat, whereas other countries have gone way up.

So Japan has overtaken us; France has overtaken us; Germany has overtaken us. Why are we not making improvements in terms of mortality or longevity of older people, whereas these other countries are?

It's a big puzzle. There are two explanations. One is that the United States is a very heterogeneous country and there are various groups in the United States that have poor health, and don't live very long. So black Americans, Hispanic Americans, American Indians, there are a number of groups.

ROTHENBERG: Sure.

VAUPEL: Migrant workers. You can think of a whole series of groups. And these—some of these groups are expanding their share of the U.S. population, whereas the native-born white Americans are becoming a smaller fraction of the overall population. So the mix is changing.

This changing mix, because it's the least advantaged, most disadvantaged groups that are growing, is bringing—it putting a brake on the increase in life expectancy.

ROTHENBERG: That is a fascinating (inaudible).

VAUPEL: So that's probably the main reason, but it's not completely clear. I just want to tell you one other possible explanation, which is interesting.

ROTHENBERG: Go ahead.

VAUPEL: That the immigrants, migrants into the United States, have exceptionally long lives, it turns out. They are exceptionally healthy. Even poor migrants. Even poor Hispanic migrants into the United States. So there appears to be a healthy migrant effect. The people who move to the United States and stay in the United States appear to be healthier than average.

You might say, you know, migrants have a certain amount of gumption. Perhaps they have a certain amount of spirit and drive. So the number of elderly migrants in the United States, the number of people above sixty-five who were born in foreign countries, used to be very high. And then it declined because immigration into the United States in the 1920s and 1930s declined. There were a lot of barriers to immigration.

So another explanation for why the United States is not doing so well at older ages is that all these healthy migrants that we used to have, we don't have so many any more.

But at younger ages we still have quite a few.

ROTHENBERG: I want to ask you one other biology question here, before we move into policy. Now, if you don't know the answer to this, just say so. You don't have to know the answer to this.

VAUPEL: No, I don't know everything.

ROTHENBERG: I've always been curious about this and I have—I've rarely talked to demographers who know about health.

We hear about small groups of people, mountain groups, live to be, you know, 120 years old, and they eat goat cheese and they drink red wine. I don't know where they are—whether they are in France or in Eastern Europe or in the mountains of Asia. I've often wondered, are there these groups? Are there groups like that, small, maybe isolated populations that do have dramatically longer life spans than we do? Does anybody know, is it primarily biological, their DNA, their parents and grandparents, or is it primarily the fact that they are eating goat cheese and drinking red wine?

VAUPEL: It turns out I actually know something about this. I edited two books about this. And almost all of these small populations, when carefully checked, it turns out that age reporting is unreliable.

ROTHENBERG: Ah!

VAUPEL: The typical situation is that an anthropologist or demographer visits this group and asks people how old they are. Then the anthropologist or demographer comes

back five years later and people are ten years older! It is truly remarkable. So these groups tend to be in isolated areas, where there are very poor records. There are no good birth certificates. They also tend to be in cultural areas where it is prestigious to be old, especially for the men. So there is a real exaggeration of age.

In fact, I can say—and this is not only true in remote areas of the world, it is true in the United States as well, is severe age misreporting on census forms of older people. The best guess of demographers is that the number of centenarians reported by the census is four times higher than the true number of centenarians in the United States.

There are several reasons for this. I mean, one reason is that sometimes the very old people are demented and a younger person has to state the age, and the younger person may not know the age.

ROTHENBERG: Piece together...yeah.

VAUPEL: And this, you know, “My great uncle looks very old. He must be at least a hundred.” They don’t know for sure.

Sometimes it is because of prestige or just, you know, you’d like to have older relatives.

So there is a lot of misreporting. It’s fair to say that around the world as a whole, most centenarians are not. They are younger. So you have to be very, very careful at looking at these data.

ROTHENBERG: Another romantic notion that we can all move to these small mountain...

VAUPEL: Yeah.

ROTHENBERG: All right, Jim. Let’s segue a bit more to public policy, what this means for politicians and for people, as I say, who have to pay taxes, and people who are trying to arrange their families, and—

You wrote something—you wrote—it’s always dangerous to quote somebody back to himself: “History is determined by population forces and democracies are governed by demography. I thought that was an interesting point from which to begin.

Leaving aside the question of is history really determined by—do you really believe history is determined by population forces or by nature and leaders and biology?

VAUPEL: Ferdinand Braudel, the great French historian said, “All of history, both in the short term and the long term, is determined by population forces.” So there are schools of historians who believe this. Certainly the long-term trends of history are determined by the sizes of the populations of different areas of the world.

ROTHENBERG: But those populations are, in turn, determined by, as we've talked about, some environmental factors.

VAUPEL: Yeah.

ROTHENBERG: And political decisions.

VAUPEL: That's—yeah, no abso—no. I don't want to downplay the importance of the presidents of the United States!

ROTHENBERG: OK. So the—we are going to have, we are having, and we will have, I think, further significant changes in population. This is obviously going to present significant problems for elected officials.

I remember for Colorado Governor Dick Lamb, at one time, was talking about seniors and the cost of health care. I believe he spoke admiringly of a tradition, Eskimo tradition—we don't know if it's even true—they put them on an ice floe and send them out. And he said, "Well, maybe we should do that with seniors."

That's not—that's not going to happen. What are the—what would you identify as the major public policy challenges because of this change in life expectancy and life span?

VAUPEL: Yeah, as I see it, long life is not fundamentally a problem. It's a challenge. It's not a problem. It's really the crowning achievement of modern civilization.

Most people would like to live long if they could have a healthy long life.

ROTHENBERG: Sure.

VAUPEL: Society consists of the people who belong to society. To say that the older members of society should be put on ice floes is ridiculous. I wonder how Governor Lamb feels about this now when he's a little bit older!

But the—it turns out that many young people don't fully understand that older people, most older people, enjoy their lives. They enjoy a different kind of life than younger people enjoy. They spend more time reflecting on things. They have—memories are very important to them. Their grandchildren are very important to them.

But nonetheless they have satisfying lives and happy lives, and most older people would be—you know, are not looking forward to death.

So these people are part of our society and—these people should—in making decisions we have to realize that these people are a major part of our society.

They are not outside of our society. It is not as if our society is the young people. It's everybody.

Secondly, the—wouldn't you like to live to see your grandchildren? Wouldn't you like to live to see, you know, who is president of the United States in the year 2050?

ROTHENBERG: I am just waiting for my kids to get married! Let's go there, first. But the answer is sure! Sure! Yeah. I'd like to—yeah.

VAUPEL: OK. So you'd like to live to see your kids get married, right? Sure. And you'd like to, you know, you'd like to participate in human life for as long as you could, as long as you are healthy and can think about what's going on.

So what we have to try to do is to figure out how we, as a society, can best take care of ourselves as an aging society and not view older people as a problem, but to view older people that—the needs of older people as a challenge that we have to address.

ROTHENBERG: Sometimes we do just focus on older people, the burden—the problem—taking care of mom and dad and finding a nursing home, or—

But it—but the problem is—not the problem, but the situation is not simply that we are having—we will have more older people, but that we also have a lower birth rate, so that we have a fundamentally different mix in the population. How is that—how—does that not have a particular effect?

VAUPEL: It turns out the United States is doing very well in that regard. The birth rate in the United States is at what demographers call replacement level. That means that—

ROTHENBERG: Is it right at replacement?

VAUPEL: A little bit above, actually. So people are having the number of—men and women are having the number of children needed to, in the next generation, to replace the current generation.

So the United States—in Europe and in Japan, fertility is very low. Each generation is about two-thirds as big as the previous generation. But in the United States, each generation is about as big as the previous generation.

And, in addition, the United States is welcoming hundreds of thousands, in fact, probably a million immigrants a year into the country. And so the—and people are living longer. There are three ways for a population to grow. You can have more babies. You can have some migrants. You can live longer. It's all ways of growing the population.

So the United States' population is growing, and we're now close to three hundred million people, and by the middle of the century we might be five hundred million people. And by the end of the century we might possibly be eight hundred million people.

So it's not as if the United States is facing a problem of population decline.

It's true that the age mix of the U.S. population is changing a little bit, because we have many more older people than we used to have. But the United States' population is growing fast enough that we still have lots of workers and still have lots of people of school age.

ROTHENBERG: So the problem is significantly greater for the Europeans and Japanese?

VAUPEL: In Europe and Japan this is a major problem, major challenge. But the United States is really fortunate, and the long-run economic and social prospects for the United States are much better than the long-run prospects for Europe and Japan, because of this.

The United States is doing—this is one area where the United States is really doing well.

ROTHENBERG: Now, you talk about, again, in a number of your papers, you talked about the notion of the elderly. And you say, "One way of dealing with the elderly is to change the notion of what is it to be elderly, or who those senior citizens are." I'm just trying to get it so I can get into those movies for, you know, three bucks or whatever. Half price!

How, how would you describe elderly or senior citizens? How do we them now? How do you think we should be describing them? And what impact is that going to have on American public policy?

VAUPEL: Well, once again, the United States is doing very well in this regard, compared with Europe and Japan. In the United States, ageism is not as serious as it is in other developed countries. In the United States now mandatory retirement is unconstitutional. People are allowed to work as long as they can productively work. They can't be fired merely on the basis of age.

In fact, when you hire someone you are not allowed to ask how old the person is. The United States is moving beyond ageism. Europe and Japan are not yet.

I think the direction the United States is taking is the correct direction that age should not be the criterion for whether or not somebody can work. The criterion should be whether the person wants to work and is able to work. As people live longer, as I said before, they are most certainly going to be living longer because they are living longer healthier. So that a seventy-five-year-old person today might be as healthy as a sixty-five-year-old person was, you know, when Social Security was started fifty, sixty years ago.

If a seventy-five-year-old person would like to work, then the United States' economy should allow that person to work. And the United States' economy is allowing older people to work.

So some of the challenges that the European and Japanese economies are facing because of a shortage of workers, and because of the burden of large numbers of older people who are not working, are not faced by the United States.

The United States is also moving in the right direction by raising the age at which people get full retirement benefits. So it is gradually going up to sixty-eight and could go up higher.

Basically what we are doing, and I think we should do, is to first of all change the definition of elderly. It's going up.

Secondly, get rid of the notion of age as a criterion and treat people as individuals, based on the skills and interests that they have.

ROTHENBERG: So, Jim, you don't want me to get those senior citizen discounts at the movie theater?

VAUPEL: No! I don't want to do discounts!

[Laughter]

ROTHENBERG: Let me ask you—following up on this. You talk about how if people, older people want to work, they should be allowed to work. We are talking about delaying the retirement age.

For much of the quote unquote mainstream media, they have a very different take on this. Their take is, we are forcing people to work old—to later in life. They can't retire. You mean we are going to for—move the retirement age up? That somebody's got to—somebody still has to work at seventy or seventy-five years of age?

Their whole assumption seems to be very different. Would you agree that's the case?

VAUPEL: Absolutely.

ROTHENBERG: Why do you think that is?

VAUPEL: Well, there's a notion that's been developed mainly over the last hundred years, to separate life into three boxes. The first box you get educated, so you finish high school, you finish college, you finish graduate school and you are educated.

Then the second box is you work.

The third box you spend decades in forced leisure.

It doesn't make any sense to me to divide life up that way. But life has been divided up that way, and the number of people in most developed countries—once again,

especially—this is especially Europe—the number of people who are working after age sixty has fallen dramatically, especially over the last twenty years.

So people have sort of—people have developed an assumption that they have a right to decades of leisure at age sixty or age sixty-five.

I don't see where this right comes from. People have a responsibility to contribute to society. We have to maintain the economy. If there are very large numbers of people who are not working at older ages, then that's going to be a burden on younger people.

I mean it may be true that work is for some people something of a burden for older people. But if they don't work there is going to be higher taxes, there is going to be a burden on younger people.

Somebody has to do the work of society and if older people don't contribute to the work of society, younger people have to. I think it is very unfortunate that so much of the burden of society is being placed on working—people of current working age, because these are also the people who have children. Mothers and fathers who should be spending time with their children are often forced to take a second job, or to work very hard. Both husband and wife have to work. Less time is devoted to the children.

In fact, the whole situation strikes me as just crazy. That we work hard during exactly those years when our children need us and then when our children don't need us, maybe don't even want to see us any more, we take time off for twenty, thirty, forty years.

ROTHENBERG: It is really—it is odd. It could be that older people when they still work could work at different kinds of jobs, right?

VAUPEL: Yes.

ROTHENBERG: So you would expect fundamental changes in society. You might expect changes, where people would be—there would be different kinds of jobs, different types of people moving there. Let me ask you this: Do people—people don't—maybe again this is—might be off your beaten path here. Do people not like to work? I mean, I don't—I enjoy what I do. Maybe people would say this isn't work, what you and I do is not work.

VAUPEL: (Inaudible)

ROTHENBERG: But retire? What would I do?

VAUPEL: No. It's complicated. I mean, some jobs are boring. Some jobs are very repetitious and—

ROTHENBERG: Sure.

VAUPEL: Some jobs require very hard physical labor and people can get just tired out. They can get worn out from some kinds of work.

But my reading of the literature is that most people prefer to work—they prefer to have an opportunity to meet other people. They prefer to think about themselves as contributing to society. Not being pushed off on the side.

But on the other hand, there may be people who would like to have a long retirement, and that's OK as long as they've saved up enough money for it. I mean, they should—my view would be that people should have an option of either saving, working hard when they are young, saving money so that they can have a long period of retirement when they are older, or working less hard when they are young, maybe spending less time working and more time with their children, and then having to work longer when they are older. There should be flexible options so that people who like to work and are willing to work to higher ages have the chance to do that, and people who want to retire early can do so if they save enough money to support themselves when they are older.

But I don't think they should impose that burden on other people. You know, that we should move—we can't have a system where payments to older people amount to 50 percent of the income of younger people, which is the direction in which we would go if we kept the current retirement age.

ROTHENBERG: Let's turn specifically to Social Security.

VAUPEL: OK.

ROTHENBERG: I guess I should get your quick thirty-second take on this. How much in danger do you think the system is? How much financially, how much of a threat does it face in the next couple decades?

VAUPEL: Yeah, the Social Security Administration bases its fiscal projections on life expectancy projections that are too pessimistic. People are going to live longer than the Social Security Administration predicts. As a result, the fiscal stability of the system is less strong than the public documents would indicate.

But, nonetheless, basically the U.S. Social Security system is in good shape and that's because we have large numbers of younger people, because the total fertility rate is high, because we have lots of migrants.

There will have to be some adjustments in Social Security. No question about that. The age of retirement, where you get full benefits, will have to go up. No question about that.

So there will have to be some reforms. But the basic system will survive.

ROTHENBERG: All right. Well, let's address some of these potential public policy options with Social Security, in particular. Raising the benefit age. Changing the actual benefits themselves. Level of benefits. Some sort of privatization to where that you either

can or can't use, depending upon your politics. Reflect on these and on their impact on the population and/or politicians' ability to make these tough decisions.

Or anything else you are hearing from the administration, as well.

VAUPEL: No, no—I agree. I agree. Cutting benefits would be very difficult for many older people and I can—I mean, you can understand, this is really the least good of those three policies. It would be most desirable if we could keep the benefits fairly high so that older people who do retire could enjoy a good life.

ROTHENBERG: Current benefits for people who expect to live on those current benefits.

VAUPEL: Yeah. No. But then we have to take into account—so—

ROTHENBERG: OK.

VAUPEL: We have to take into account that people are living longer and longer.

ROTHENBERG: Right.

VAUPEL: so current benefits, spread out—that have to be paid for a longer and longer number of years— that's going to get to be an oppressive burden on taxes on younger people.

So, as I said before, almost certainly older—at least some older people are going to have to work longer.

The age at which people get full retirement benefits will have to go up. There is no reason that people—not everybody, because some people are disabled, some people are worn out, but the people who are able to work longer, you know, should work longer. That would enable the entire system to survive.

But if the Social Security system could be set up all over again, which it can't be, it would have been a good idea if it had been set up so that it was vested contributions, so that people contributed money. That money earned interest, was invested in the stock market or the bond market or whatever, and then when people got older they were able to use the money that they had invested.

Then the system would be completely self—

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—bond market or whatever, and then when people got older they were able to use the money that they had invested.

Then the system would be completely self-sustaining and then people would have the option of retiring younger and not having quite so much money, or retiring later and having more money, or taking time off when they are younger, but working extra years when they are older. That kind of flexibility would be highly desirable.

The problem is that the Social Security system was not set up that way, and to move from the current system to that system is expensive. There has to be a transition period, and during that transition period people have to pay extra taxes.

But it seems to me that that in the long term and over—gradually—the United States should try to move in that direction, because that'll be much better for everybody if they—if people could decide on their own working life careers.

ROTHENBERG: My understanding is to some sort of mixed privatization.

VAUPEL: Yes.

ROTHENBERG: Mixed system from the one we have now.

My understanding is that younger people are very receptive to new approaches, trying new things, but is there a cut-off point, after which people say, “No, I’ve—we have a deal. The government and I have a deal. They better not change that deal.”

VAUPEL: No, no. Sure. I mean, the closer you are to retirement age, the more of a deal you have. I mean, the more you have based your decisions over the course of your life on the promises that you think the government is going to fulfill. So I think that's perfectly reasonable that people in their fifties and sixties, they have a deal with the government.

Younger people, there's more flexibility.

ROTHENBERG: Is there anything else the government can do to Social Security, do you think, to make it somehow reflect our changing age patterns in this country?

VAUPEL: Well, the system should be actuarially fair in the sense that if you decide to retire at some age, the amount of money you get per month should depend on what age you decide to retire. If you work longer, then your future benefits should reflect the fact that you've made additional contributions and that you have not taken out money. So—and the United States' system is close to being actuarially fair right now. It should be kept actuarially fair. That way people can make up their own minds about whether they want to retire at sixty-two or sixty-five or sixty-eight, and they can decide whether they want less money and retire earlier, or money and retire later.

That kind of flexibility is very important. The more we can enhance that kind of flexibility, the better. That's why I was saying that if you had vested accounts that would enhance that kind of flexibility.

Then, secondly, there should be as few barriers as possible to people working after normal retirement age. Part-time work should be encouraged. There should not be tax penalties or other kind of penalties against part-time work, that as you said before, people should—it should be possible for people to shift careers. There should be continuing opportunities for re-education. Let—older people could take new skill courses or new kinds of training courses. Shift from one line of work to another line of work.

The more flexibility, the better.

ROTHENBERG: Well, let me—I don't want to leave this area of Social Security, but I just want to turn a little bit to Medicare and other health and longevity, longevity issues.

As you point out, people are going to be living longer. There is more medical intervention. More technology is going to allow us—allow us to improve people's lives so that people live longer and live healthier. Won't that cost lots and lots of money?

VAUPEL: Yes.

ROTHENBERG: Where are we going to get it?

VAUPEL: Well, what are we going to spend—

ROTHENBERG: Do we know how much it's going to cost?

VAUPEL: Well, in other words, it's—no—I mean, every year it's going to—

ROTHENBERG: I mean, is it going to triple or quadruple in a five-year period?

VAUPEL: —depends on the time frame. But the—think about it in the following way: I read—I don't know if this is true, but I read the other day in the paper that there are more radios in the United States than ears. And there are more cars than drivers. And there are more televisions than rooms.

And so what are we going to spend out money on in the future? As we get richer and richer, it seems to me that people will want to invest more and more of our wealth in health, health and education, research.

That, you know, that as we have all the consumer goods we need, if we have a television in every room and a radio in both ears, why not spend more money on health, and why not try to live a healthier life. That'll become a bigger and bigger priority, especially as people live longer.

So I'm not—I don't think it's a fundamental problem that health care costs are rising. The—the question is to make sure that the money we spend on health is spent efficiently, it's not wasted, and that these dollars are actually being used to improve people's health.

ROTHENBERG: But the dollar figures, Jim, are so big and so intimidating—

VAUPEL: Yes.

ROTHENBERG: —that it causes people, causes politicians, to say we have to set some sort of absolute limit on the number of dollars that we can spend per person. In terms of the politics of it, it's awfully easy to complain about spending large amounts of money to keep people alive another six months, or even another year. Isn't it? I mean, it's a significant—you are talking about a demographic opportunity.

VAUPEL: Yes.

ROTHENBERG: But that has created political, a serious political problem.

VAUPEL: Yeah. No—

ROTHENBERG: As a demographer, how do you answer that? Not as a public poli—not as an elected official.

VAUPEL: No, no, no, this is what—yeah, no, OK. But—it is true that the percentage of the U.S. gross national product that we spend on health is much higher than in other countries, and it is growing rapidly.

And quite a lot of the money may be wasted, not really benefiting people. I'm not an economist. I'm not a health economist. I don't know what fraction is wasted.

ROTHENBERG: Well, the economists don't know, either, so—

But I'm sure there could be some savings, some efficiencies. And—the system, the amount of money that we spend on health has to grow at a controlled way. It can't—there can't be a rampant increase in this, in this segment of our consumption.

VAUPEL: But the—my reading of the evidence is that when large amounts of money are spent trying to save somebody's life, sometimes it works. And very often it works, as a matter of fact.

These horror stories about huge amounts of money being spent on someone who died have to be countered by success stories of large amounts of money being spent on somebody who actually survived.

Furthermore, this notion that this money is extending people's lives for six months—my reading of the evidence is that that's true, sometimes. But other times this money is extending people's lives by ten or twenty years.

And even an eighty-year-old man has about ten years of life expectancy—remaining life expectancy ahead, on average. And if an eighty-year-old man can be saved from a heart

attack, that eighty-year-old person may have ten pretty good years with his grandchildren and great-grandchildren before death.

An eighty-year-old woman has even more years of life expectancy left, maybe twelve years. If she could be saved from some infectious disease, she might—you know, if she could be saved from influenza, then she might enjoy the most—not all, maybe, of the remaining twelve years of life, but maybe eight or nine or ten of those years might be good years.

ROTHENBERG: And she could contribute in a positive way to her children or her grandchildren.

VAUPEL: Yeah. Exactly.

ROTHENBERG: And change their life.

VAUPEL: Yeah, to society. And she could also enjoy herself a little bit. I mean, she's a part of society, too.

ROTHENBERG: Now, we do have an entire, a huge generation about to enter the—I don't know what to call it—senior citizenship? The baby boom generation coming in, making significant more demands on government, both for health care and for retirement support.

How much of a short-term problem is this? How much of a burden is this for public policy officials?

VAUPEL: No, it is absolutely true. I mean, it's not as if the number of older people is growing steadily. The baby boom is going to result in—when they start getting to be sixty-five or seventy, there is going to be this big—

ROTHENBERG: A surge.

VAUPEL: A big surge.

ROTHENBERG: Some time over the next six to eight years, ten years.

VAUPEL: Yeah, yeah. So the people born between 1950 and 1965—that's the people we are talking about. So if you are born in 1950, you'll be sixty-five in 2015. That's when we are going to start having some real—a real surge in the number of older people.

Depending on whether these people elect to retire at sixty-five, or they decide to work a little bit longer, the shock will be greater or less.

But—there is no long-term problem. It's a relatively short-term problem of the baby boom generation trying to absorb that shock, and they—as I said before, the United

States' economy is big enough and we have enough young people, enough working age people that this shock probably could be absorbed.

But it will be a challenge. It will definitely be a challenge for public policy makers. It'll put more pressure on the budget over that period.

ROTHENBERG: It's like a bump in the road. But once we get over that it actually will be easier, then, for society.

VAUPEL: That's right. Then it gets better.

ROTHENBERG: We only have a couple minutes, but I wanted to ask you about one other question—something that is on the minds of everybody that follows politics, as well as health care.

And that is stem cell research.

VAUPEL: Um-hmm.

ROTHENBERG: There was just an initiative out in California. We've had a lot of debates in Washington, on Capitol Hill. It just struck me that generally this whole area of medical technology and biotechnology is opening up a whole 'nother set of questions, public policy questions.

Do you believe we are going to be increasingly consumed by these kinds of questions? Or is the technology going to give us answers to the—some of these questions instead.

VAUPEL: Well, the—let me make several points. The first point is that stem cell research will almost certainly result in new technologies that will help people live longer, healthier lives. As I said, earlier, the stem cell research will result in regeneration of—enable us to regenerate damaged tissues. So to regenerate damaged heart tissues, for example, regenerate damaged brain tissues, and this will really improve people's quality of life.

Secondly, stem cells don't have to come from fetuses. You can take stem cells from adults, and there are a lot of very promising stem cell technologies that are based on taking stem cells from the person himself or herself.

I mentioned before that you can take—I think I mentioned before that you can take bone marrow from a person, inject that bone marrow in the person's heart if the person has had a myocardial infarction. The stem cells in the bone marrow will help regenerate the heart tissues and the blood vessels in the heart.

So we are not necessarily talking about fetal stem cell research, which is very controversial. I can understand why people would come down on—some people would be very, very, very opposed to that.

I don't like the idea at all. But stem cell research more generally, stem cell research based on adult stem cells, it's hard—why would anybody oppose that?

ROTHENBERG: But we do see a lot of discussion these days with science and biology and medical research running against a strong, moral agenda, not to say that one is right or wrong, but there seems to be—when you come to biology and you are talking about life and morality, do we not seem to be coming to more points of contention on these kinds of issues?

VAUPEL: Well, as I said, I mean, to the extent we are talking about fetal stem cell research, then people who care about abortion are rightly very upset. When we start talking about genetic engineering, genetic manipulation, I can understand why people would be upset—that if we we're trying to change the genetic makeup of people, this might—we have to be very, very careful about what is done.

We don't want to create a species that is half pig and half human. I mean, that would be terrible.

ROTHENBERG: And it reflects that this is just—there are amazing opportunities out there for people, as we age, and as we grow healthier and happier?

VAUPEL: Yeah. I'm—as you said before, I am optimistic. I'm actually, if you look at the full spectrum in the middle of the road, because there are large numbers of biomedical scientists, people who are doing work in stem cell research, genetic research, who are even—who think that the breakthroughs over the next twenty or thirty years will be enormous. And within the next twenty, thirty years, we may be able to prevent and cure Alzheimer's. We may be able to prevent and cure cancer. We may be able to prevent and cure heart disease, which would result in an enormous increase in healthy human life span.

ROTHENBERG: Well, let's hope so, and this has been a fascinating discussion, Jim.

VAUPEL: Well, thank you very much.

ROTHENBERG: I really appreciate it. I have been talking to Dr. James Vaupel, director of the Max Planck Institute for Demographic Research, and a senior research scientist at Duke, a member of the National Academy of Sciences. Thanks so much, Jim.

Thanks for joining us for another one of our SAGE Crossroads programs, a monthly program, another in a series, a program of the Alliance for Aging Research and the American Association for the Advancement of Science.

I'm Stu Rothenberg. Thanks for joining us.

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