



What are the Possibilities and the Pitfalls in Aging Research in the Future?

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KONDRACKE: Today's debate is formally entitled "The Future of Aging: Pitfalls and Possibilities," but I think an informal subtitle would be "Brave New World or Fountain of Youth?" because our two discussants have very different views about where aging research is leading us—and they are distinguished commentators indeed.

Francis Fukuyama is the dean of the faculty and Bernard Schwartz professor of international political economy at the Paul H. Nitze School of Advanced International Studies at Johns Hopkins. He has written widely on issues concerning democratization in the international political economy, and he is, I guess, most famous of all for his book *The End of History and the Last Man*, published in 1992, which has been published in over twenty foreign editions. He's got a provocative new book out called *Our Posthuman Future: Consequences of the Biotechnology Revolution*, which raises the specter that we're headed toward that brave new world.

Also joining us is Ron Bailey, who is the science correspondent for *Reason*, the monthly magazine on politics and culture. He has written articles for *Reason*, including "Forever Young: The New Scientific Search for Immortality," and he's working on a new book to be called *Liberation Biology*, which we will get into. Previously he's done several weekly and documentary programs for public television and ABC News, and he has written for innumerable publications including the *New York Times Book Review*, *Smithsonian*, *National Review*, *Forbes* and *Reader's Digest*. Ron, welcome.

FUKUYAMA: Thanks very much Mort. I really appreciate being invited to speak, although I sense that I am being set up in a certain way as having to take the losing side of this debate. If this were the Oxford Union the question would be something like, Early death, disease, debility: pro or con? and I'd be asked to take the pro side. I think that there are a lot of things that can be said about biotechnology in general, but I want to focus particularly on the aging side since we are being sponsored by the Alliance for Aging Research, and I think that that raises some of the most difficult questions.

Now, as I said, I don't think I can seriously win this debate if it's posed in that form, and I'm not going to really try. I think everybody would like to live longer—they would certainly like that longer life to be healthier; I don't think anyone can possibly contest that. Although I've argued in my book and other places that we need to update and modernize our regulatory system to take account of some of the new technological developments in biotech in the area of aging, I don't think that is appropriate. So nothing I say should be construed as making a case for blocking anything or stopping or regulation, because I think that is simply not doable. All I want to do is say that the quest for life extension and the prolongation of life through biomedicine is simply not as unalloyed a good thing as I think some people think it is. We ought to think carefully about where we are headed. We may not be able to head off this particular future, but I think it's worth thinking about it.

Now there are, I guess, three general categories of concern. One is a very simple utilitarian one, which is that much of the value of life extension obviously depends on the quality of life that is being extended. I would say that although this is something that people don't like to address, all of the great advances in biomedicine up to this point that have brought us life expectancies up in the mid-eighties for women for example are themselves not an unalloyed good.

At the age of eighty-five, something like fifty percent of people develop some form of Alzheimer's, and the reason you have this explosion of this particular disease is simply that all of the other cumulative efforts of biomedicine have allowed people to live long enough to where they can get this debilitating disease. Now maybe we will cure it through further biotechnology, but the rate of progress in solving these age-related problems tends to be uneven. It would be nice if we could assume that in the future all of these technological developments will allow every system to keep going until all of a sudden—boom—one day we simply die, having lived as twenty-year-olds up until then. But I think that the probability of that this will happen is probably low. We can imagine some scenarios that are pretty grim, actually, where people would like to die and aren't able to.

I had a personal experience with this; my mother was in a nursing home for the last couple of years of her life and if you see people caught in that situation it's really a fairly morally troubling thing because nobody wants their loved ones to die, but these people are simply caught in a situation where they have lost control. So that is one thing—we don't know whether this is going to happen. It may be that future progress will be quite even and the scenarios won't materialize but it's something worth thinking about.

The second argument—and this should appeal to libertarians that take individual choice seriously—is really a question of the social consequences of life extension. Life extension seems to me a perfect example of something that is a negative externality, meaning that it is individually rational and desirable for any given individual, but it has costs for society that can be negative. I think if you want to understand why this is so, you just think about why evolution makes us, why we die in the first place, why in the process of evolution populations are killed off. I think it clearly has an adaptive significance, and in human society generational succession has an extremely important role. There is the saying among economists that the science of economics proceeds one funeral at a time, and in a certain sense a lot of adaptations to new situations—politically, socially, environmentally—really depend on one generation succeeding another.

For better or worse, people come into the world with a certain world view that is formed when they are born and they generally tend not to give that up at later stages of their life—even through a lot of political progress, a lot of scientific progress, a lot of adaptation to new circumstances. For example, the only people that vote Communist in the former Soviet Union right now are people that are over the age of sixty-five. I think there are a lot of issues like that that have to do with life cycles; things that may be desirable from an individual standpoint may have consequences, and certainly if that life

extension is at a much lower level of activity or health, the economic consequences could be quite serious.

I guess the final set of issues has to do with the whole quest for immortality and what that suggests as a desirable human good in and of itself—apart from all of this consideration of social consequences. We have this kind of assumption that if a life of 78 years is a good thing, then a life of 140-160 years must be twice as good. It seems to me that is not obviously the case. If what drives this quest of immortality is a fear of dying, then in a certain sense it's a fool's errand because you are going to die sooner or later; you're simply putting off that moment and not facing that aspect of human existence.

Further, the real question is—and this is the area where I think I can least persuade anybody, but I myself take this quite seriously—what we live for and what we want those years for. “What we want those years for” in terms of quality, and by quality I don't just mean, are we healthy? It's a question of higher goals that we live for, not simply extending the life span.

I think you must consider that the noblest virtues in human societies have always been associated with people that have a certain relationship to death. For example, when taking into consideration people who are willing to risk their lives on behalf of causes greater than themselves, one has to ask the question, Well, what does this desire—the possibility of indefinite life extension—mean for that particular set of virtues and the whole possibility of facing death?

Mort mentioned my book was called *The End of History*, and it does seem to me that Nietzsche's “last man” would be subscribing to *Life Extension* magazine—too eager to continue his or her mediocre life for as long as possible without worrying about some of these higher questions about what that life is used for. But again, as I said, this is not an argument that I expect; it's not an argument really in favor of any particular policy. It really is simply meant to raise a different set of moral questions about what is really our objective in seeking these kinds of goals.

KONDRACKE: Thank you. I would not be as defensive as you think you have to be here; I think that you raise some very challenging points about what life is all about. We'll even get into these various social implications and political implications that you've raised—questions about whether science is in the purpose of changing human nature and our political structures as well—so don't feel as though you can't convince anybody.

Ron Bailey, you wrote in an article in *Reason* magazine that the defining political conflict of the twenty-first century will be the battle over life and death. On the one side stand the partisans of mortality—which I take it you would regard as the party of death, or if you want to be even more critical, you'd say the party that counsels that humanity should quietly accept our morbid fate and go quietly into that good night. On the other side is the party of life—where I gather you put yourself—that rages against the dying of the light

and yearns to extend the enjoyment of a healthy life to as many people as possible for as long as possible. What is your thesis here?

BAILEY: Well, I'm definitely going to say that on the question of resolving who is in favor of death, debility and disease, I am on the con side of that. But the Alliance for Aging Research and AAAS, I thank you for having this discussion. The media advisory I got had the question, Are scientists playing God? and I note that on Sunday the *Washington Post* informed us what the answer was. They put God on notice.

In any case, I would like to deal with some of the same issues. My speech would be entitled "First, Do No Harm." I would like listeners to remember three things from my discussion. First, the point of aging research is not to enable us to be older longer, but rather to allow us to be younger longer. The goal is not to have a world filled with nursing home residents—and there may be transitional problems, which Francis Fukuyama has identified—but the goal is not to get older longer.

The second thing is that I would like people to remember that human beings are constituted by evolutionary history in such a way as to identify the potential problem first and to think about negative issues. The way a zoologist buddy of mine explained it when I was complaining: he said, "Ron, think about it this way, when we were growing up, evolving, in Africa, some guy would say 'there is a tiger in that tree is going to eat you.' You would pay attention to that and run away. But if he said, 'You know, there are some fruit trees over that mountain there and some benefits you could get,' you'd say, 'No, I'll think of that tomorrow.'" So we are constituted mentally to think about problems, and it is very hard to think about benefits. I think we can get into some of that later.

And then, as I said, my talk is "First, Do No Harm." There are definitely people, of which I don't think Francis Fukuyama is one, who do believe that biomedical research should not aim at lengthening human life spans. For example, Leon Kass, the president's favorite bioethicist, asserts, "The finitude of human life is a blessing for every individual, whether he knows it or not." Or there is Daniel Callahan, who is from a different political perspective—he's a co-founder of The Hastings Center. He has declared, "There is no known social good coming from the conquest of death." Yet also, of course, the worst possible way of resolving the issue is to leave it up to individual choice. So I ask, what life-lengthening research would such opponents ban? After all, treatments to prevent or cure Alzheimer's will likely have the side effect of normal brains functioning better longer. Treatments to cure or prevent heart or other circulatory diseases will also lengthen life. Treatments to prevent or cure cancer will certainly extend the span of our days. Can such people as Callahan or Kass seriously want to limit research for cures for Alzheimer's, heart disease and cancer?

But perhaps I am mischaracterizing the opponents. Perhaps what they really want to do is in some sense limit treatments that are aimed specifically at the process of aging itself—such as treatments that would reduce the damage caused by free radicals. But undoubtedly it will turn out to be the case that such therapies that reduce the damage caused by free radicals will be very useful in treating specific diseases such as

Alzheimer's, heart disease and cancer. The fact is that biomedical research is almost by definition aimed at lengthening healthy human life, so again what research opponents think should be prohibited on the grounds that it illegitimately aims at lengthening healthy human life spans? I think they need to answer that question.

Let's take a very brief look at some of the social consequences of longer average healthy life spans. The first concern often mentioned is that longer life spans will contribute to the overpopulation problem. Keep in mind that the reason the world's population quadrupled in the twentieth century was not because people began breeding like rabbits, but because they stopped dying like flies. Demographers believe that the normal life expectancy of 1900 was around thirty years; today global life expectancy has more than doubled to sixty-six years. I ask: who can doubt that this increase in average life expectancy has resulted in the greatest mass improvement in human well-being and happiness in all of history?

Well what about the future? Won't much longer life spans cause massive overpopulation? University of Chicago demographer Jay Olshansky has calculated that if everyone on the planet were immortal tomorrow—we woke up and had the happy news that we're now immortal—while maintaining the current projected trends in current fertility, world population would rise to around thirteen billion in 2100. That number, he notes, is the same number the alarmists like Paul Ehrlich used to predict that would be for the middle of this century, by 2050. I suspect that the vast majority of people would be very willing to take on the problems of longer life spans and figure out ways to deal with them. I believe that one hundred years would give human society enough time to adjust to longer, healthier lives.

Another argument sometimes heard—we heard it here by Frank Fukuyama—is that the elderly have an obligation to future generations to die and get out of the way. Please remember that our ancestors did not ask us if it was all right for them to more than double their life expectancies; they just went ahead and did it because they knew there was a high human good to achieving that.

With regard to this notion that longer life spans are a negative externality for society, I should point out that at least Hobbes would argue that society was at least created for the purpose of enabling people to live lives that were not nasty, brutish and short; in other words, society is for the purpose of helping us live better and longer lives.

So what about getting out of the way of the younger generation, which is also a concern we also have heard raised here? Actually, our society is already organized to encourage just that. And I'm not talking about things like mandatory retirement. Professor Fukuyama worries about how to dislodge set-in-their-ways geezers clinging to the top positions in our society. But consider that Bill Gates didn't work his way up the ladder at IBM; he started his own company before the age of forty. Or, consider that biologist Craig Venter didn't wait to become head of the National Institutes of Health; he went out and created the Institute for Genomic Research, Human Genome Sciences, and Celera. In other words, our competitive society already makes sure that dead wood gets cleared out

pretty regularly. And it's the same thing with our politics; we have regular elections where forty-somethings like Bill Clinton can become president.

Of course, there are likely social benefits in a world where people live longer. Already we see some. Families the world over are having fewer children because the ones that they have will likely make it to maturity. The average woman in 1960 had around 6 children over her lifetime, and locally that number is down to 2.7 and continuing to fall. Also, it's a truism that human beings are very shortsighted. However, if we can regularly plan on living more than a century, we may develop more foresight and wisdom about the long-range effects of our activities.

Opponents of biomedical research talk a lot about hubris. But it takes more than a little hubris to believe that you are wise enough to tell other people to reconcile to themselves that disease, disability, and death is the best thing for them. With regards to those opponents who assert that certain biotechnological research violates human dignity, I think that they owe us a more precise account of just what constitutes violation of human dignity if no one's rights are violated. Dignity is a fuzzy concept and appeals to dignity are often used to substitute for empirical evidence that is lacking or sound arguments that cannot be mustered. After all, what is so dignified about dying of Alzheimer's, diabetes or cancer?

The president's bioethicist, Leon Kass, told the *Washington Post* earlier this week, "The pursuit of perfect bodies and further life extension will deflect us from realizing more fully the aspirations to which our lives naturally point, from living well rather than merely staying alive." I want to suggest to you that this is a false dichotomy. To live well one must first stay alive. So to answer the question posed here—Are scientists playing God?—I believe the answer is no. Human dignity is not a quality that depends on limiting human lives to a certain span of years. The highest expression of our human nature is to try to overcome the limitations imposed on us by our genes, our evolution, and our environment. The highest expression of our human nature is our quest to maximize individual human flourishing, alleviate physical and mental disease and disability, and lengthen healthy life spans. Future generations will look back at the beginning of the twenty-first century with astonishment that some very well meaning and intelligent people actually wanted to stop biomedical progress just to protect their cramped and limited vision of human nature. They will look back, I predict, and thank us for making their world a world of longer, healthier lives and for making that world possible for them. Thank you.

KONDRACKE: Well thank you very much for launching that, both of you. This is deeply provocative stuff. I have a feeling, though, that Frank Fukuyama would not say that we shouldn't develop cures for Alzheimer's disease; I think there is a larger philosophical question. We can get back to, Is the world going to be overcrowded? in a second, or to, How can we afford to take care of all these old people who are in retirement? and the social consequences.

Let me just raise the fundamental question of Frank's book, in which he says that in *Brave New World* Aldous Huxley argues that "we should continue to feel pain, or be depressed, or lonely or suffer from debilitating disease, all because that is what human beings have done for most of their existence as a species." Frank says that the aim of his book is to prove that Huxley was right; that the most significant threat posed by contemporary biotechnology is the possibility that we will alter human nature and thereby move us into a post-human stage of history. Human nature shapes and constrains the possible kinds of political regimes that we have, so a technology powerful enough to shape what we are will have possible malign consequences for liberal democracy and the nature of politics itself—which is the highest philosophical plane of discussion. Now what is this dystopia that you fear this biotechnology will produce?

FUKUYAMA: Well actually, there are several things wrapped up in that; the political concern that was alluded to in the passage you quoted really has to do with the possibilities for social control that these technologies offer. I think that one of the reasons we ended up with liberal democracy is that a lot of the ambitious social engineerings that were tried by various utopian regimes all failed, and they failed really because of human nature. In Communist society you wanted to abolish private property and family, and people just weren't engineered that way, so they resisted it. That's why we've ended up with a fairly benign outcome at the end of the twentieth century where liberal democracy is really the only game in town. But that's really dependent on technology, and if you have technology that in a much more scientific way understands the basic roots of behavior—and a lot of this comes out of cognitive neuroscience and is manipulable, not so much by genetic information but by things like neuropharmacology—that gives you a fairly powerful set of tools for one group of human beings to alter and control the behavior of others. I think in some sense you see this beginning, with the way we medicate young children with drugs like Ritalin.

The deeper issue is this whole question, which I admit to a lot of people seems fuzzy, of human nature and human dignity and the rights that come out of that. I would simply say that you can say it doesn't have a sound empirical basis, but virtually every one of us believes in it in some form or another. Our Constitution was founded on a respect for human beings as having certain inalienable rights that come from a certain set of essential characteristics that defines a human being. All the big political struggles in our history have been focused on who is admitted into this charm circle of people who have human dignity. African-Americans were excluded and women were excluded, and they are now allowed in because they possess those essential characteristics as much as white males do. But there is this human essence that in my view is really determined by the extremely complex nature that we have been given by the evolutionary process, and it's an essence that we don't understand the complexity or wholeness of.

The hubris is—I don't like the phrase "playing God"—the hubris is that we simply do not understand the complexity of our own social structures, and the attempt to engineer and to improve incrementally this thing and that thing for limited aims is almost inevitably going to have unintended consequences, some of which could be extremely serious. The idea that we can simply use technology to master this is hubristic. It is true in a lot of

other areas. People thought we could damn rivers and produce electricity and didn't understand that there were huge environmental consequences as well.

KONDRACKE: Well what is your ultimate nightmare? *Brave New World* raises the possibility of “soma” where everybody is zoned out and therefore can't respond to any unpleasantness—and in fact have ruled out unpleasantness. I would think that one of the things that you would be afraid of would be genetic engineering, somehow tinkering with germ line cells to the point that you could manufacture different castes of human beings to be worker bees or rulers or something like that. Is that what you're talking about? We're talking *Blade Runner* kind of stuff. Do you think that is a realistic possibility, and is that what you are worried about?

FUKUYAMA: I think that kind of germ line engineering is much further off in the future—maybe Ron will have a different opinion—I think that is not going to happen any time soon for a number of reasons. But I think that is something important to worry about because if that technology does come down the road, you have at least one scenario that is troubling. That's actually greater uniformity because you get social trends that people follow where they don't want their kids growing up gay or different or something like that.

KONDRACKE: But you think genetic selection is a bad thing?

FUKUYAMA: It's not a bad thing per se and it's not the method that's questionable, it's really the uses to which it is put. Genetic selection and that whole range of technology assumes that we know what makes a better human being, and this gay gene business is a good example of that. If you could engineer that out that out of a child's genome or prevent that chemical or biological predisposition to gayness would people choose this? Is it a power that they ought to have? And by doing that, they say to themselves, “Yes, I will improve my child as a human being.” These issues are fraught with—there is a big normative dimension and its not so simple to say, “Yes we're going to make the human race better and they will be grateful to us later on for having done that.”

KONDRACKE: Ron?

BAILEY: Sure, a couple things. One is that I know you were saying that we have a document which guarantees inalienable rights and among those inalienable rights are life, liberty, and the pursuit of happiness, which I don't think contradicts in any way the notion that we should have life extension or allow people to go ahead and...

FUKUYAMA: Well, who gets it? That is the important point. What creatures are entitled to have those rights? Because we don't give them, for example, to chimpanzees even though they share ninety percent...

BAILEY: The fact of the matter is, we do make gradations in society already, as you well know, based on the capacity and there will be a standard where if you have a particular known capacity, you get the full set of rights. That is what we've been doing.

That is what happens. Our human nature up until two hundred years ago warranted things like slavery, warranted things like women being chattel. Our human nature is not what made us better, it was a political decision over time because we learned more about what we were like and we continue to do that. I think that in fact what the technology does is enable greater levels for human beings. I think that's what we have to focus on with regard to genetic engineering.

FUKUYAMA: That still seems to just get around the whole question of what is this essence that we are trying to protect that is the foundation of our life. Every one of us implicitly believes that there is this creature that is endowed with these rights and science itself may give us more information as to the genetic information of different species and so forth, but it doesn't give us any guidance on that normative question of why would we afford superior rights to certain classes of beings, and that's the central issue.

BAILEY: Again, that's a political decision that we've made over time and we will continue to make those decisions. I agree with you; liberal democracy is probably the final state of human society, and I think that we are not going to move backwards. We may in fact expand the scope of rights, but we are not going to remove the rights.

KONDRACKE: Ron, if it were possible to define a gay gene would you be in favor of equipping parents with the right not to have gay children? Is it laissez-faire?

BAILEY: No. For that particular issue the way I come at the problem is a little bit different. What I am trying to do in some of my writing is find the kinds of things that human beings would want to have—capacities that they definitely would want to have. Let's face it, people would prefer to be more intelligent than they are; they would like to have a healthier immune system; they might like to avoid certain kinds of diseases. These are general capacities that other people naturally get—people already have this. I see no reason to deny parents access to technologies that can provide those capacities for their children as well. Now with regard to things like eye color and so forth, we do not say, "You are allowed to do that," because at least at this point it is too fraught with danger and too likely to be a fad. It may be well be that the gay gene problem falls on that side of the line. I haven't thought that through yet.

But again, I want to point out that we don't have to think through everything now because as our technologies incrementally advance, we learn that human beings are terrible at foresight. The problem is we always see dangers and we try to stop them. We ignore the benefits; we do what human society has done to advance: we try something new. We develop something and if it doesn't work out then we say, "Gosh, that didn't work out," and we move backward and there is no perfection to it. There is no way to in advance warn against all problems. My favorite example of technology with regard to foresight is the guy who invented the laser in the 1960s. He said, "I have no idea what this could possibly be used for," and look at it now. There are lasers everywhere now. We use them to fix our eyes; we use them to do surgery; we use them to run our printers. The fact of the matter is that technologies have lots of beneficial consequences that cannot be foreseen. It is a lot easier for us to imagine dangers than it is to imagine benefits, and I

would like to stress that I think that most people will see benefits stemming from biotechnology.

KONDRACKE: Now one of Frank's theses in the book is that the government needs to step in and regulate biotechnology, and you seem to think, Ron, that there is a place for government to regulate technology. I have a feeling that you each would regulate different things or give the government certain powers that the other wouldn't. But what is it, Frank, that you would have the government stop? Is it therapeutic cloning? Is it genetic designing? Do you want to ban Prozac?

FUKUYAMA: Let me make a couple of points. First of all, we already heavily regulate biomedicine and we in fact ban Prozac for certain uses. We ban Ritalin for certain uses. We make a distinction between therapeutic uses of these drugs and biomedicine generally, and what you might call non-therapeutic or enhancement uses. So it isn't as if this is something new. And we've got this institution here in Washington called the Food and Drug Administration that already sets lots of limits. We could advance the speed of medical research vastly if we allowed doctors to run clinical trials, like the Nazis did where people were deliberately infected with agents, but we take a slower rate of advance because we don't like that kind of free experimentation for ethical reasons. So the precedent is that we regulate, and the question is, do we need to modernize that system of regulation? For example, the FDA has rather casually asserted an authority to regulate human cloning. It is not as clear that the statute allows them to do that or whether that assertion of authority would stand up under court challenge.

I'll just give you a very concrete policy example where regulation is necessary. If you want to have the cloning, I think what you need is a system like the one that now exists in Britain under the Human Fertilization Embryology Act. That act created a Human Fertilization and Embryology Authority that regulates embryo research in Britain. Every embryo that is produced has to be registered with the government, and they track what happens to it. There is a requirement that it actually be destroyed after fourteen days so you can't clone an embryo and then let it grow into a fetus and then harvest the organs or something of that sort. In fact, it facilitates research cloning in Britain because it provides firebreaks against the kinds of slippery slopes that unregulated pursuit of this kind of research would lead to.

KONDRACKE: How do you feel about that, Ron? Theoretically, to take the example of cloning, if you could have a fetus forming and use developing embryos, and if you could take stem cells, why not harvest hearts? What is your view of that?

BAILEY: Well, I'm against that. I should point out that the FDA, when we're talking about regulation, regulates for three things typically: safety, quality, and efficacy. We don't impose values on people. We don't say Prozac is bad for people to use. We say it should be safe, it should be high quality, and it should work, and that's why we have it and the fact is, those standards should remain. The troubling problem I have is creating an agency that would be able to impose uniform values on the rest of society. The values

are what are a struggle for me, sitting around deciding for everybody else how they should live their lives and what a perfect version of human nature should be.

KONDRACKE: Let's go back to the aging issues and the issue of longevity. Frank, what Ron says is the purpose is not to simply extend life but to make life more healthy, and theoretically it would be possible to not have people living the last fifty years of their lives with Alzheimer's. Couldn't we figure out ways and things to do? There is lot of work to be done—taking care of children, helping the needy—and theoretically could we find useful work for people if they were robust long past one hundred in a democracy?

FUKUYAMA: Well sure. I think Ron is probably right that we will eventually adjust to this sort of thing. I think that a lot of it really does depend on exactly how robust those lives are and I agree that this aim of this research is not to be old for longer but the question is can we get it and no one can predict that, no one can control that process. Callahan and Kass are not saying, "Stop research on aging." They have particular positions on stem cells for other reasons, not because they want to stop work on aging, and I'm not saying that either. I'm just saying there is a kind of presumption in a lot of these debates that anything that prolongs life or cures a disease is automatically and necessarily a good thing and that that goal trumps any other kind of moral consideration, and I am just saying that is not self-evidently true.

BAILEY: First of all, Callahan does say, and I can actually cite—he points out in his last book that "no new medical technologies should be developed at all until all technologies are currently available and deployed to everybody." He also says nothing more than palliative treatment should be allowed to anyone over age seventy. So he's definitely against this, period. But with regard to things like technologies having problems, for example one, of the last guys who received one of these artificial hearts just died last week. The fact is that there will be people who will take these risks, and they should be allowed to take them. I think they know what they are doing, and their lives may not be the quality you would want, but the fact is that they are participating in the process of trying to make lives better for us all. Technologies are not perfect out of the gate, and again there will be a messy birthing process to all of these technologies, but because there will be problems is not a reason to stop them, and I think you agree with that.

KONDRACKE: There is a microphone over there. I invite you to throw question at the discussants. Please participate. We do have a couple of questions from the Web site... One is related to how the media covers science: "It's often difficult to discern hope versus hype. How do you balance the hope versus the hype in your beliefs regarding the progress of science in aging research?" In other words, are we being overly optimistic, are all these hopes that we are citing legitimate, or is there hype going on here?

BAILEY: Well, as a journalist, I've probably done my share of the hyping, but I think that actually these technologies are all possible and will likely come to fruition probably much less rapidly than we would like. I've just been doing some research by the way. One of the arguments you often hear is, "We have to have a societal discussion about all of these technologies." Well, I want to point out that with regard to cloning we've been

having these discussions forever, starting out with *Brave New World*. But there was also an article on the front page of the *New York Times Magazine* in 1972 and they thought we'd be cloning people by 1980. The fact is that none of these technologies will likely be coming around as rapidly as I would like, but they will all be available by the end of the century.

KONDRACKE: Studio audience, yes, go ahead.

AUDIENCE MEMBER: First of all, I would suggest that the issue of immortality is a red herring. One thing I would say with regard to unintended consequences of research is that the one intervention in aging that we know that works is caloric restriction, and yet caloric restriction applied in mammals—which is the best model we have for humans—in fact really has no more effect than extending life by thirty or forty percent. The thing we do know about this is that in fact these animals are in better health. So they are not in poorer health longer, they are in fact in better health longer. They eventually die of the same things that rats or mice die of who are not treated with caloric restriction. So I really think it would be nice if we could get this issue of immortality out of this debate on aging research, because I really think it's not going to happen. If you extrapolate mouse and rodent results to humans what you're talking about is average life spans of 110 to 115, which we already know is the maximum that's been observed. I don't have a particular question, but I would be interested in any comments you may have.

KONDRACKE: What is the possible life span here that we are talking about? Immortality is probably off the charts for the foreseeable future, so what is it we are talking about and what are the consequences of a 110-year life span?

FUKUYAMA: Well, while I'm the one that used the word "immortality," I doubt that it's ever going to be possible. What I think is more important is what is driving the desire for longer life spans ultimately is something like a desire for immortality. Do people somehow think that it is more humanely appropriate that people live to be 150 rather than 70? Is there something magical about that number? No. Why not 300 rather than 150 or 600 rather than 300? The logic of this really is a desire to put off death and that is the only reason I use that word. I think it is a fool's quest in many respects to even think of that as a goal.

BAILEY: The way I prefer to think of the issue is we should try to make death optional. The problem is, the quest for immortality is not something that is new to human nature. The fact is that evolution threw up a creature that could reflect on the fact that it is going to die, and if we look at our cultures, I would maintain that our cultures are devised around two things: reproduction and death. One of the oldest myths we have comes down to us from ancient Sumeria and is the Gilgamesh saga where basically the hero is trying to find a way not to die. And what do you think pyramids and cathedrals are? Aspirations toward life, a different kind of life, because they couldn't imagine physical immortality; it was all too obvious that people died fairly frequently in the bad old days. And now I think Frank Fukuyama is right; we are the desire here. The impulse here is the natural impulse is to live a long, healthy life, and perhaps forever, if possible.

KONDRACKE: Other questions. Yes, go ahead.

AUDIENCE MEMBER: A little bit before Gilgamesh is Cicero's essay on aging where Cicero is having a conversation with two younger citizens. They said, "Well don't you mourn the fact that you are not as vigorous and healthy as we are?" And he said, "But I have other opportunities at my stage in life," and I think that is something that we can't lose a perspective on. What value does an older citizen have and what can they contribute? Do we need to make them just younger and more like the twenty- or thirty- or forty-something? Is there something to sustain the value that they add at that stage in life? So your perspectives are complimentary, I believe, not so much a dichotomy of views. Do you have any comments on that?

FUKUYAMA: Well I do think that there is a certain logic to the human life cycle; that there are certain things that are appropriate when you're a child, and others when you are a young adult and starting a family, and that other virtues occur in later periods of life. One of the things that I find disturbing about this quest for the extension of life is that it completely interrupts that life cycle—a hypothetical case where you've got people not dying at all. Reproduction has to basically go away as a central issue in people's lives and I think that is profoundly unnatural. You may say, well what is so great about nature? but I do think that we all have a very strong attachment to these natural forms of living by which we believe we flourish as human beings.

KONDRACKE: Ron?

BAILEY: I actually don't see any contradiction at all. You're right. The fact is that we don't value people because they are physically old; we value them because of their experiences and the way they've shaped their lives and the advice they can give us. I don't think that will go away. In fact, I think that will get even better, that they will be able to provide us with greater wisdom over time if they stay vigorous and healthy into old age. I don't think that's a contradiction at all.

KONDRACKE: We are going to lose our Web connection right now. Thank you, those of you who have been on the SAGE Web site, for joining us. We'll have one more question afterward, but I think this has been a wonderful beginning to what is going to be a very rich series of discussions. We will be getting into more practical subjects in future discussions, as in, "Can we afford to have millions and millions of healthy old people in years to come?" But for those of you on the Web we are ready for sign-off, so thank you very much.

End.