Welcome to the third lecture in the series Global Diseases Voices from the Vanguard.

Voices from the Vanguard is a joint effort between the Center for Tropical and Emerging Global Diseases and the Knight Chair in Health and Medical Journalism.

College of Journalism and Mass Communications with assistance from the office of Provost and I'm very glad that all of you are here tonight.

Thank you for coming, it is a very lovely spring evening.

As most of you know this lecture series is intended to help create and strengthen the interest in global health that exists across the breadth of the UGA campus. Both speakers thus far in this year's series Eric Gotteson and Zeda Rosenberg have provided their front line visions of how they think people can make a difference in global health and tonight Dr. Roger Glass the director of the NIH's Fogarty International Center and a world renown expert on rotaviruses is here to share his insights into the realities, the challenges and the opportunities to improve global health.

Before I ask Dr. Phil Page 1
Williamson the dean of UGA's<br/>
College of Public Health to introduce Dr. Glass, <br/>
<time begin="00:02:01.52"/>I'd like to first remind you<br/>
of<br/>
two things, actually three things<br/>
<time begin="00:02:03.14"/>and one is this is a blue<br/>
card event and<br/>
so seek out the person for that, <br/>
<time begin="00:02:05.27"/>second on April 24th we will<br/>
wind up this<br/>
years Voices from the Vanguard with one<br/>
<time begin="00:02:11.68"/>of the actual voices, someone<br/>
who speaks<br/>
on this, Nick Thompson the spokesperson<br/>
<time begin="00:02:18.01"/>for the World Health<br/>
Organization in the area<br/>
of global infectious diseases will be here, <br/>
<time begin="00:02:25.83"/>that's April 24th and I hope<br/>
you will all<br/>
plan to be here and just respect him.<br/>
<time begin="00:02:36.80"/>And then the last thing is as<br/>
always<br/>
there will be a reception next door<br/>
<time begin="00:02:38.60"/>and that will be following<br/>
tonight's lecture.<br/>
<time begin="00:02:39.65"/>Now I am pleased to ask<br/>
Dean<br/>
Williamson to introduce our speaker.<br/>
<time begin="00:02:41.51"/>[ Pause ] <br/>
<time begin="00:02:47.69"/>We are very pleased to<br/>
have Dr.<br/>
Roger Glass visit UGA and I would<br/>
<time begin="00:02:52.36"/>like to tell you just a<br/>
little bit about him.<br/>
<time begin="00:02:56.92"/>He received his undergraduate<br/>
dergree<br/>
from Harvard College and his MD degree<br/>
<time begin="00:03:03.88"/>from Harvard Medical<br/>
School<br/>
and his Masters of Public Health<br/>
<time begin="00:03:07.17"/>from Harvard School of Public<br/>
Health.<br/>
<time begin="00:03:08.51"/>He also earned a PhD in<br/>
microbiology in Sweden.<br/>
<time begin="00:03:09.81"/>He has spent the last 30<br/>
years working in<br/>
several positions between the CDC and NIH.
Through both the good times and the bad, Dr. Glass has been on the front line of rotavirus research and provided public health including working with scientists and epidemiologists and some public health policy majors. His research is targeted at neurological studies for the introduction of rotavirus vaccine and he has maintained field studies throughout the world including studies in countries such as India, Bangladesh, Brazil, Mexico, Russia, Vietnam, and China just to name a few. A complete listing of his awards and memberships would be too extensive to do here tonight. But just to give you a few of them, he is a member of the Institute of Medicine and National Academy, a member of the American Academy of Microbiology and he received the outstanding service medal from the US Public Health Service. He has authored and coauthored over 400 publications and he is fluent in lectures in five languages. Last June, Dr. Glass began his current duties as Director for the Fogarty International Center and Associate Director for international research at NIH. As many of you know the Fogarty International Center is the international component of the NIH and addresses global health challenges. Tonight Dr. Glass will be
discussing global health and the 21st Century: Lessons from Rotavirus.

Please join me in welcoming Dr. Glass.

[Applause]

Thank you. Thank you very much dean. I'm delighted to be here today particularly because when I came in the door I saw the writing in chalk on the door step that said, "For Everything in Love." Is that why you came? How many of you have actually heard of rotavirus? Raise your hands, oh my gosh I'm amazed.

I went to the CDC in 1986 to talk about, to having worked in Bangladesh and NIH. I went to the director of the CDC and I asked him about rotavirus and he was welcoming me back and I spent an hour telling him all about rotavirus the disease and its prevention with my work in Bangladesh and afterwards he wrote me a note welcoming me back and he wrote to me as the chief of the retrovirus laboratory. He didn't know the difference between a retrovirus and a rotavirus and that I had an upward battle to attack. So I am going to talk to you a little bit about my love of rotavirus if you will. The lessons that I've learned from rotavirus and global health and how that's led me to my current job, but before
I begin,

I'm amazed that you've all come to hear about diarrheal diseases before dinner so we'll move on.

My undergraduate major was in the history of medicine and I was very interested in the epidemiology of cholera because cholera is at the basis of epidemiology and global health. You know the quarantine system and the public health service hospitals in the US were all based around cholera and epidemiology really came from John Snow identifying the broad street pump here in London in 1854 plotting out these little cases of cholera and showing that epidemiology could link these to the pump and that by removing the pump handle you could actually stop the disease. And stop an epidemic.

So I figured that epidemiology was really simple and I should go off and study cholera and see why we still had a problem of cholera in the world today and also from the early studies of cholera there was a first vaccine for enteric disease, a cholera vaccine here developed in 1893, never very effective but it was still the basis of immunology of an enteric disease.

And finally it was because of this pump and that I thought that if I went to a cholera endemic area like Bangladesh, like Ganges Delta I might actually be able to take the handle off the pump if you will and stop cholera.
So after I was at CDC for a couple of years I went off to Bangladesh with my wife to see what we could do to stop cholera in the world. This was a naive mission of a young person, so it’s not so bad to be naive and here’s what we saw. It’s basically the same pump and the same children getting the same water and getting cholera so I figured that this would be an easy match.

A patient with cholera has severe dehydrating diarrhea, they can lose 10 percent of their weight in liquids in 12 to 24 hours. So if you’re a 60 kg person and you lose 6 liters you’re on deaths doorstep and this is what happens with the disease. It’s now completely treatable by rehydration with intravenous fluids and water and salt solutions but in 1960 this was not so, it was a highly fatal disease. So here’s a young girl and you can see that she is so depleted that she’s shocky, her eyes are sunkin, she tints of her skin under the doctor’s hand and she’s at death’s doorstep. With oral rehydration she can get up and walk away, so it’s with this that I got into diarrheal diseases and tried to look at how important were diarrheal diseases in the world today.
and our spokesmen around the country,
eye we have had a
different epidemic, Smallpox, Ebola, West Nile fever,
and the like, anthrax. But in fact these are not the real killers in the world.
The real killers are the diarrheal diseases, Malaria, Tuberculosis,
acute respiratory diseases,
much less sexy but much more important.
So here I began to look at where diarrhea fit into the leading causes of mortality
and after ARI in children,
diarrhea is the next major cause of disease in the world and of these
about 20 to 45 percent of these diarrheal deaths are from rotavirus, much more them cholera.
So I scratch my head and I think a lesson for you all is where’s your next job going to take you
and how are you going to earn money and
I decided that if I was going to work on cholera it would be hard to find a lot of cholera cases when I came back
to the United States, I better work on something that was global and that which is global is rotavirus.
So this background really led me to go to NIH and then to begin to work on rotaviruses.
Well and the one feature of rotavirus which is very important is that it’s a democratic disease,
and what do I mean by democratic?
It affects blacks and whites, rich and poor, everyone gets rotavirus.
In fact every one of you in the audience has had rotavirus in your first few years of life and probably have been infected multiple times since, although without any symptoms. But that first infection can cause a severe dehydrating diarrhea that can be lethal in a small percentage of cases, well here’s rotavirus, it’s the most common cause of severe diarrhea in children, it’s a democratic virus and of course in this republican administration, I was advised that I should call it an equal opportunity virus, not a democratic virus so I have to change this slide or leave it till the next administration perhaps.

First infections are asymptomatic, there’s good evidence of natural immunity, there’re limited strains in circulation and of course my son got rotavirus the day I started the rotavirus lab at the CDC and why would my son get rotavirus, you know we have a clean house, we wash our hands, there’s clean water, there’s good food. Why does my son get rotavirus? It’s not clearly from clean water, poor sanitation or anything like that, we really don’t know enough about transmission of this virus but we do know that because we can’t stop it in our country with clean water and clean food.
Glass.txt

<time begin="00:11:23.50"/>that vaccines represent a way to prevent this disease.<br/>
<time begin="00:11:27.73"/>So here's a child in Mexico with a<br/>
cute, unhappy child who had for 12 hours,<br/>
<time begin="00:11:37.21"/>severe vomiting episodes, 8 episodes of<br/>
vomiting, couldn't hold a thing down.<br/>
<time begin="00:11:42.02"/>Followed by diarrheal episodes,<br/>
about 20 in the 12 hour period<br/>
<time begin="00:11:47.26"/>and here the child is getting IV's to<br/>
prevent shock and to be rehydrated.<br/>
<time begin="00:11:53.16"/>It's a very severe disease in<br/>
the small number of children and here when this child,<br/>
<time begin="00:11:59.43"/>this is an autopsy from a child who died and the<br/>
intestine is all broken up and what you see<br/>
in the intestinal cells, all of these little dots here are the viruses,<br/>
taken over the cell of this child's intestine causing death.<br/>
<time begin="00:12:05.93"/>So it can be a very severe and fatal disease.<br/>
<time begin="00:12:10.07"/>Well where does rotavirus kill?<br/>
<time begin="00:12:22.92"/>And here is the distribution of diarrheal deaths<br/>
from rotavirus and you can see that there are<br/>
about a 100 thousand in India alone.<br/>
<time begin="00:12:31.72"/>Most of the deaths are in South Asia about<br/>
150 thousand in Sub Saharan Africa,<br/>
about 20 thousand in Latin America.<br/>
<time begin="00:12:39.55"/>So if we had a vaccine and we have vaccines now.<br/>
<time begin="00:12:43.37"/>These vaccines will be most helpful to prevent<br/>
death in Sub Saharan African, Asia, South Asia.
But in the US and Europe and Australia, Japan, they would really not stop diarrheal deaths, we don’t have them, but they would stop hospitalizations, clinic visits, doctor visits and the cost incurred. Well here’s the disease burden and as I look around now at the importance of diarrheal diseases in general, this is really key.

Every child here, gets rotavirus. About 114 million episodes a year of rotavirus diarrhea. About one in five children will have to go to a doctor or clinic to get rehydrated because the disease is that severe. About one in fifty or so will need treatment as inpatients because the disease is severe enough to require intravenous and about 1 in 200 to 1 in 300 will die of their disease in their developing world. So this is clearly an important cause of death, about five percent of all deaths in children under five will be from rotavirus, so it’s because of this huge disease burden that I really saw this as a priority.

Well when I went back to CDC we had no data on rotavirus in the United States, and you know in the government if you can’t document how important your disease is compared to someone else’s disease, you know, you’re...
cooked, you just can’t make it.<br/>
So we had to go out with few
resources and few people and figure out what the burden of rotavirus was in the US.<br/>
so here’s what we did.<br/>
We looked at hospitalizations for children under five years of age, here you see it here by month for a 20 year period from about 1979 to, 79 to 1998, 1997 and you can see each year there are about 200 thousand children hospitalized for diarrheal diseases, that’s about 10 to 12 percent of all hospitalizations of children in the US, a huge number. And of those there’s this winter seasonal pattern each year in children under 5 and that’s seasonality is most apparent in children from 6 months, 7 months, to 2 years of age and there’s a little bit at two to 3 years and then it goes away.<br/>
So a big seasonal peak in winter, and we’ve now learned that, that seasonal peak of winter diarrhea is rotavirus. Well if we were to have a vaccine, and we have a vaccine this year 2006 for the first time, what would we expect to happen in a few years. Well if we’re right and you can watch this in the next few years, we would expect this curve to flatten out, those big winter seasonal peaks of
diarrhea hospitalizations to go away and we would have a nice flat line where a third lesser, 40 percent fewer cases, hospitalization for diarrhea. Furthermore in the first year of this program we hope that these, this light blue curve of children under 1 year will go away by the end of this year or sometime next year, so this is one of the ways we are going to monitor the impact of a national immunization program. So our disease burden in the US has very few deaths but lots of hospitalizations at an incredible cost about, over a billion dollars a year. And it's with this type of data that we were able to convince American pediatricians and the advisory committee on immunization policy in the US to take rotavirus vaccines for, as a program for a globe, for US immunization, universal immunization of all children, so if any of you have small brothers or sisters or nieces or nephews who are just born or under 1 they should be getting a rotavirus vaccine this year. Well let's go on to the virology and how we get to this, the vaccines. Here's a picture of a rotavirus, a schematic of a rotavirus here and it's a virus that's made up of a shell, a protein shell, an outer coat like a basketball and inside are 11 segments of double stranded RNA.
nucleic acid and each of these can be separated on a gel and each one codes for a separate protein, a different protein. Well what does your body see when it sees this virus, what does your gut see when it sees this virus?

It sees what's on the outer coat just like what I see when I look at you is I see your outer clothing, I see your clothes, I don't see anything underneath, okay. What your body sees to get an immune response is a reaction to your clothes, an antibody to your clothes if you will. And in this virus those clothes are on the outside, this bright yellow, the VP7, it's a neutralization intergen and these little spikes that allow the virus to attach to your intestine and go to work. Well this is important because it's against this outer coat that your body makes antibodies and if we want to develop a vaccine we have to entice your body to make antibodies to these two proteins. And if we can do that then when your body sees the virus it will neutralize that, it'll kill it and you won't get the disease.

So that's the idea of a live oral vaccine. So the vaccines that we'll talk about are live viruses that have been attenuated, they're not pathogenic, they're given orally.
and they give you a good immune response. Well the other thing that's important to know is that rotavirus comes in different flavors. The serotypes are defined by the clothing that the virus wears, again that VP7, the G protein and the P protein and they're basically four different types of flavors of rotavirus, one, two, three, and four. They're very creative names, okay, and if we have a vaccine against these four strains we think we'll have a vaccine against most rotaviruses. Just like Polio vaccine, it includes three serotypes of rotavirus, three flavors. But also rotaviruses can evolve and new strains can always come into the virus from rotaviruses from pigs, rabbits, cows, monkeys, dogs, and cats and the like. So even if we have a vaccine there's the possibility of new viruses evolving. And in fact in places like Argentina, all the cows are immunized against rotavirus to prevent neonatal calf diarrhea, a disease that kills about 10 percent of calves that are infected. So there are already vaccines for cows, now we're working on vaccines for people. Well we're going to go on and talk about vaccines, and when I was at NIH in the early 80's my mentor Dr. Kapikian was working on his first rotavirus vaccine.
He took a strain of rotavirus from a monkey, he reassorted it so that it would have the outer coat from different serotypes of human rotaviruses, one, two and four, and he made up a reassortment vaccine of four different strains that was called a rhesus tetravalent vaccine and that was the first licensed in the US. It took 20 years, about almost 20 years to develop this vaccine from isolation of the strains to understanding the principles of vaccine development. As soon as it was licensed, August of 1998, it went right into approved by FDA, the Food and Drug Administration. It was heralded as the first vaccine to stop those half a million deaths from diarrhea around the world and the about 5 percent of children in the U.S. hospitalized for rotavirus. It was a big thing. It went right, immediately into the routine schedule for childhood immunizations at 2, 4 and 6 months of age so that every child would get this and we were really ecstatic. Dr. Kapikian and Ruth Bishop, who discovered the vaccine, and myself, we were overjoyed and we received the Pasteur Award of the Children's Vaccine Initiative. And we really thought we had won the world.
with a great vaccine and with the ability to have a new tool to stop a half a million deaths a year. It was an exhilarating moment. Well, you know, you can’t be exhilarated for too long and in 1999 when this happened, I had a full head of hair. I want you to know, I was really, you know, almost an afro, it was huge. I lost it all in the next two years, and this is why I lost it. After 9 months of immunizing the U.S. public, 600,000 children immunized, a million and a half doses distributed, a great success in this program. We identified fifteen cases of a rare, adverse event called inteceception in a few children in the two weeks after they had received the vaccine. 600,000 kids, 15 adverse events, and everybody raised the red flag and said, what’s going on here? Well, inteceception here caused, main cause of intestinal obstruction in small children. Their bowel gets blocked at the ileocecal junction. It telescopes on itself, becomes obstructed and can be a lethal complication. You don’t want this to happen in the U.S., let alone in a developing country.
So we did an investigation to find out if this was linked to the vaccine, if so what we could do about it, and whether we could get around this problem. And in the investigation, there was a cluster of cases of intecception right after the two weeks after the first dose of the vaccine, a smaller, but insignificant cluster after the second, and we really knew the association was real, but we didn't know the level of risk. Whether this was one in 2,000 here, as it was first thought, or one in 28,000 as it was later thought. A very important difference. Why is it important? Well, in developing countries where one and two hundred children will die of rotavirus, to have an adverse event of one in 30,000 would mean that if you save 150 children's lives for every case of intecception that might occur. So it's, it might be that in a developing world this would still be a very useful vaccine. Well, my real target was the developing world that I lived in, Bangladesh, and this is where I was interested in protecting children primarily. So we called the ministers of many developing countries together to say we've got this rotavirus
vaccine, fabulous vaccine for protecting kids against diarrheal diseases, rotavirus virus, but it has this rare, adverse event. Would you still use it? Would you still see the benefit of this for your population? What would you say? You'd save a couple hundred children for every adverse event? Clearly in the U.S. where the disease is not fatal, the adverse event that might lead to surgery or obstruction is pretty bad, but in a country where one in 200 kids dies of the disease, where there'd be thousands of hospitalizations. Well the ministers thought there and scratched their head and finally one of them, from India, came back to me and said Roger, great vaccine, we would love to use it tomorrow, but, but the first time we identify a case of intecception in one of our children who was vaccinated, the newspapers will be all over me and they'll ask the question how could I permit this vaccine to be used when it was withdrawn from use in the United States for this very complication. If it had been tested here and licensed it would be one thing, but it hadn't been used, so I better step back. And so we lost the first vaccine almost 10 years ago and in that 10 years about four million children
have died of this diseases who might have been saved by a vaccine. Well, what we learned in the process was that inteception spares children in the first 3 months of life and then part of our problem was that we vaccinated children up to six months. From three to six months the rate of inteception for whatever reason in natural goes up about 10 fold. Half the children we vaccinated were over 4 months of age, they were in catch up phase, half were under. And most of the inteceptions, 80 percent were in these older children. So we told the other manufacturers that if they ever wanted to use a live oral vaccine, they should probably restrict its use to those children under 3 months of age for reasons that were not completely obvious. So here was our balance, our scale, should we use the vaccine or not? One death in 250 children, lots of deaths and admissions or inteceptions and we threw the vaccine out. Well this has been an incredible year for rotavirus and in 2006, last year, two new vaccines were finally came forward and were licensed. And these are, one is a...
single strain, rotavirus, common human strain, that was attenuated because it was passage for a long time. The other was a strain, a vaccine just like the rhesus strain, the first vaccine, but made with a bovine rotavirus virus that was much weaker and didn't cause, we think, the same, wouldn't cause the same problems, and so these were both licensed in January of last year, 2006, major clinical trials of over 60,000 children were published in the New England Journal. For each of these, the pentavalent vaccine here and the monovalent vaccine here, and they were really success and a beginning. And these were nominated by Lancet as the best papers of last year in the medical literature. Well, let's look at these two and see where we are. The pentavalent, just like the rhesus is given in actually three doses, grows poorly and was highly successful, 98 percent protection against severe disease in Finnish children and American children. So it was a good vaccine and it was safe. The other vaccine, a monovalent, also grows well and it was very safe, as well, and this one was tested in Latin American and Finland.
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forward. <br/>
In March of last year,

here's<br/>
the president of Panama roling<br/>
out the first national<br/>
immunization program for rotavirus in Panama. <br/>
Another program took place in<br/>
Brazil last year. <br/>
So now there're over 90<br/>
countries that<br/>
have a licensed rotavirus vaccine. <br/>
But are we home yet?<br/>
Do we raise the flag again and greet success?<br/>
Even though I don't have much<br/>
of my<br/>
hair left, is it time to celebrate?<br/>
Well, the vaccines are licensed in many countries,<br/>
but we still can't celebrate completely. <br/>
Well, why not?<br/>
You know? As I get older you'd always like to move the celebration date up,<br/>
but sometimes it's hard. <br/>
We've tested these vaccines in the U.S. and Latin America. <br/>
We haven't tested them on African children or on Asian children, <br/>
for instance in Bangladesh or India. <br/>
And for oral vaccines, for parenteral vaccines, for injectable vaccines, all children behave more or less the same in their immune response and the routine vaccines that we give to children are all work pretty well. <br/>
Oral vaccines are different. <br/>
You know, the virus has to be swallowed, it has to
go through the stomach's acid and survive, it has to be given in the presence of breast milk, in breast milk and neutralize the virus. Mothers in Bangladesh and in South Africa have high titers of maternal antibody that can make the immune response work less well. So until we get a global recommendation for these vaccines, we really have to know if they work. Trials of the Merck vaccine are just starting in five countries in Africa and Asia, Bangladesh, Vietnam, Kenya, Mali and Ghana. And trials of the GSK vaccine, that monovalent, has just been completed in South Africa. So we hope that these will work, but the immune response in the South African trial is about half of what it is in Finland, and that suggested the efficacy may be less than we want, less than anticipated. If we have a vaccine that's only 50 percent protective, 30 percent protective, would we use it? And what could we do to improve it? So that's the next challenge before us now and whether by withholding breast feeding, by raising the dose of the vaccine by giving it a little bit later, we can do, by changing the buffer, by changing the dose, we might make it better. Alternatively, like with polio, we might try
a parenteral vaccine, an inactivated vaccine, and see if we can induce the same immunity that we get with polio with an inactivated parenteral vaccine. So here's where we are now with vaccines, we have two vaccines, the Merck and the GSK that have been tested and licensed but they still are waiting a WHO recommendation for global use until these trials are completed. And a bunch of other trials of other vaccines that are in development and we hope that by having vaccines made in China and Australia and India, in Germany, that we might have cheaper vaccines that would be suitable for the world's children. So we have now six candidate vaccines being made by 12 companies in five countries with a hope that in a few years, we might have vaccines for the world that will be cheap and affordable. And that's our current research agenda. Well, when I went to ask ministers of health if rotavirus was important for them, most of them had never heard of rotavirus. So in Vietnam, I went in 1978, 1998 and I asked the minister if he was interested in rotavirus vaccine. He said we don't have rotavirus here. I said have you ever tested for rotavirus? So in Vietnam, I went in 1978.
He said no. So he said well, why don't we do a little study and we got a grant from WHO to do this study. We looked at four cities of Vietnam, north and south, six hospitals, and we went out and we screened 5700 children under five who came in with diarrheal disease for rotavirus with a very simple, but sensitive test. 56 percent of those children were positive.

So the minister saw this and he scratched his head and he said this means that if I use the vaccine, I could decrease my diarrhea hospitalizations in half. I could cut my diarrhea mortality in half or some fraction of that. So this would be a fabulous and important vaccine for us.

So part of our efforts at CDC was then to go out and set up surveillance and let many ministers of health, like the minister in Vietnam know the importance of this disease in his setting. We started out with nine countries of Asia and again, Myanmar, Malaysia, 56 percent of their children had rotavirus as a cause of diarrhea hospitalizations. And the like high rates from 39 to 60 percent all around Asia. We now have surveillance all around the world in more than 50 countries and their rates are averaging ...
40 to 50 percent. So this is clearly a global disease and just by doing surveillance we've educated ministers and pediatricians of the importance of this disease in their setting. We've also educated Bill Gates. You know, Bill Gates in 1997 was trying to figure out what to do with his money. He read the World Development Report and in that report it said rotavirus kills a half a million people a year. Our data from CDC put into the World Development Report. He says I don't believe rotavirus can, well, what's rotavirus? I've never heard of it. How can it kill this many people? He also said if a 747 crashed today, you'd hear it around the world. If rotavirus kills a half a million, no one hears about it. What's wrong with this picture? And so it was rotavirus that got him to invest the first time in the accelerated development and introduction of four vaccines. Well, after Bill and Melinda Gates got interested in this, they put some of their money, 750 million.
dollars into the Global Alliance for Vaccines.<br/>
<time begin="00:34:27.98"/>And that went to, and<br/>
rotavirus<br/>
was prioritized with pneumococcal vaccine,<br/>
<time begin="00:34:32.98"/>as one of two vaccines for<br/>
accelerated<br/>
development and introduction.<br/>
<time begin="00:34:37.01"/>And, of course, the<br/>
international<br/>
finance committee, Gordon Brown,<br/>
<time begin="00:34:40.77"/>Tony Blair have gotten<br/>
the<br/>
Europeans behind financing this.<br/>
<time begin="00:34:45.64"/>So we've gone from an<br/>
impoverished<br/>
activity for a very important global disease<br/>
<time begin="00:34:50.64"/>to an activity now which is<br/>
well<br/>
funded for further development<br/>
<time begin="00:34:54.66"/>and introduction, should the<br/>
vaccine<br/>
test show that the vaccine is effective<br/>
<time begin="00:34:59.79"/>in those poor, developing<br/>
countries.<br/>
<time begin="00:35:01.99"/>So that answer is gonna wait<br/>
for us all to see.<br/>
<time begin="00:35:05.78"/>So we're beginning now a<br/>
great experiment<br/>
now to see if we can control<br/>
<time begin="00:35:08.87"/>and perhaps eliminate<br/>
rotavirus<br/>
through the use of vaccines.<br/>
<time begin="00:35:13.08"/>And for future funding, I<br/>
thought we might<br/>
call upon the Rotarians, for instance.<br/>
<time begin="00:35:18.18"/>Doesn't that look like a<br/>
Rotary sign?<br/>
<time begin="00:35:21.03"/>I thought that after the<br/>
polio<br/>
eradication, I need your approval on this,<br/>
<time begin="00:35:24.63"/>because I haven't shown this<br/>
to the<br/>
Rotarians yet, but they've done so well<br/>
<time begin="00:35:28.01"/>with polio eradication that I<br/>
thought we might<br/>
just change it to the Rotary Virus<br/>
<time begin="00:35:32.76"/>and continue their global
Now, with that said, I wanted to go on and just give you a little, I’ve made a change of careers this year, and I’m still working on rotavirus at CDC, but I’ve decided after 30 years of CDC, I should try to, I was an inch wide in rotavirus and a mile deep. We’ve worked on rotavirus and we’ve gotten it into national use in the U.S. It was licensed and used now. We have global clinical trials. What else could I do to improve the impact of global health and to make global health an important study, even on the campus of UGA, what could you do for global health here? I think part of the reason I’m here is to get you all excited about global health. I hope I can do this. So I went on to the Fogarty position, where I’m the director of the Fogarty International Center at NIH. This center is really dedicated to address global health challenges through innovative and collaborative programs for research and training. All stemming from the work of a bricklayer, John Fogarty, who became a union representative and then went to congress,
and his passion was global health, for reasons we don't understand. But because of him, we got a program 39 years ago at the Fogarty on the NIH campus that addressed issues of global health.

Well on the campus at NIH there are 27 institutes and centers like the National Cancer Center, the Heart and Lung Institute. Fogarty is the smallest of all the centers. We have a budget of about 70 million dollars, which represents, get this, for global health, one quarter of one percent of our NIH budget.

This is global health. This is what we have for global health. So it's a nice budget, but it really means that we have to be pointed in what we do and how we address this. And we also have to work with all the other centers because what part of healthcare and health research is not global in some aspect.

It's gotta be everything. So we have to deal with everyone and be really creative and partner. Well, we have research activities in over 100 foreign institutions and 60 US institutions, but ours are primarily in the developing world.
June of last year and I was greeted by this portfolio that I call alphabet soup. You see all these different letters and acronyms in here, I didn't know what they all were and you probably won't either. But I did know that coming out of this soup was collaborative research, research training for foreigners in the U.S., research training for U.S. students overseas, research training for foreign students overseas and development of institutional capacities. About 68 million dollars in budget with 400 grants overall. So I said well, what does this mean? Let me put some flesh on to all of these alphabet soups, okay? And so the first thing we did was to look at the first program that we started in 1988, which was called the AITRP. I didn't know what AITRP meant either. But it's our Aids International Training and Research Program. We started in 1988, if you'll remember, maybe before some of you were aware of AIDS, AIDS was a disease of the United States, of Haitians, of homosexuals and of hemophiliacs. And we don't think beyond our borders of the important, that AIDS would have that we
know today.<br/><time begin="00:39:16.57"/><clear/>So Fogarty, as a center for global health,<br/><time begin="00:39:23.55"/><clear/>got a grant to invest in AIDS education<br/><time begin="00:39:26.80"/><clear/>and the importance of AIDS overseas.<br/><time begin="00:39:29.70"/><clear/>And we invested in some of these young researchers.<br/><time begin="00:39:31.80"/><clear/>Well these researchers have stayed with AIDS<br/><time begin="00:39:36.40"/><clear/>and AIDS has become an incredibly important disease globally, as you all know.<br/><time begin="00:39:39.14"/><clear/>And these youngsters who we invested in 18 years ago have really become the leaders in their field today.<br/><time begin="00:39:41.91"/><clear/>So when you look at PEPAR programs, the president's emergency fund for AIDS relief and many other AIDS research activities, the people who had early grants from Fogarty are now the leaders.<br/><time begin="00:39:54.98"/><clear/>They were very important grants.<br/><time begin="00:40:04.05"/><clear/>Well, when we look at American leaders today in global health, what do we see?<br/><time begin="00:40:09.59"/><clear/>There's a common feature just like my own experience.<br/><time begin="00:40:13.60"/><clear/>And I would encourage all of you, if you're interested at all in global health, to travel, to find someplace to sit in an international setting and spend some time to gain the experience of what it is to work in a developing country or to address a problem.
that's really a problem of child survival or adult survival, something that's really important.

That experience will open your eyes, will open your hearts, it will open your careers to opportunities that you probably have never thought about before and engage you.

And I would, the first thing I would say is that all of the people who are now leaders in global health have had, like Al Sommer, who was the dean at Hopkins, spent a couple of years in Bangladesh and Indonesia before early on in his career. Jeff Koplan, the former head of CDC also spent time in Bangladesh early on. Helene Gayle was in Uganda as a baby, as a young physician epidemiologist working on HIV. So the first important point is that early childhood experience.

You're all children, you're all students. Look and seek for these opportunities because they will really change your career and what you wanna do, especially when you're trying to scratch what would be important or interesting. These opportunities are huge and they will entertain you for a career. The second is that all of these people up here work in infectious diseases. Aren't there genetic diseases overseas? How about cancers? How about heart disease?
All of that.

In the past, infectious diseases have been king of international health.

But I'm gonna tell you why that's changing in the 21st century.

And third, what's the gender of all these people?

They're all men.

And there are tremendous opportunities today.

When these people were in medical school, women were an incredible minority.

Today, women are about half of the medical students we have around the country.

And so I expect that in the future women will play a much greater role in these activities.

Well we have a program at Fogarty to send medical students between their third and fourth year overseas.

About 25 students a year matched with a student in a developing country.

16 placements in India, Asia, Africa, Latin America and these kids go off for a year to do a mentored research project.

When they come back, they are different students.

Their orientation as to what we can do to go back and solve the problems we solved.

So again, this is, opportunities are building and in fact, about 50 percent, over half of medical students entering school today want an international experience as well as many people in residencies and fellowships.
Well the second area that we tried to build up is to build up the constituency of universities around the world. We have about 19 programs in the U.S. and this isn't the idea of bringing together schools of public health, schools of nursing, graduate schools, schools of veterinary medicine, journalism, medical schools, all together around the theme of global health. And I think this is an incredibly important way to build a constituency in the United States. Global health isn't just medicine. If we want to deliver vaccines, you need a business approach, you need ethics and legal questions addressed, you have the ecology of these infectious diseases that requires ecologists and you need nurses to deal with the issue of administering anti-retrovirals. Everyone can be involved in this. And journalists to take out the messages of advocacy and alert the public. Behavioral and social scientists to figure out why people won't take their AIDS drugs or how to deal with the stigma of a disease like AIDS, which is incredibly stigmatizing. Here's what one physician can do working overseas. Denis Burkitt, everyone wonders
is it only infectious disease?<br /><br />Here, a surgeon went off to Uganda in the late 60's and discovered a disease. He didn't know what it was, but it was very common and through going to scientific meetings, he was able to link this with a big lymphoma, an African lymphoma of children. He didn't know what it was, but it was very common and through going to scientific meetings, he was able to link this with Ebstein Barr virus, a new virus at the time. It's the first viral cause of cancer identified. So he did a great thing for oncology and for cancer. He then went to a meeting at Sloan Kettering in New York and found out they were working on anti-cancer drugs in the 60's. Let's try it. He was in Africa. He tried them out. It melted the cancer away in a few weeks and was the first, one of the earliest successful uses of cancer chemotherapy. So a lot can be done. And where's Burkitt's lymphoma now? Well, there's an African lymphoma belt of Africa. These kids still fill the wards with Burkitt's lymphoma. He was disappointed that this lymphoma took his name, by the way. And we don't have a public health approach to treating the children with Burkitt's lymphoma or to understanding the mechanisms of their disease.
So a lot can be done in other aspects of medicine, not only infectious diseases.

So Fogarty is really funding other projects and trying to stimulate institutional capacity and long term collaborations.

This year at Fogarty we asked the question, we completed a project that asked the question how can the world tackle its most challenging problems?

What would you do as a minister of health if you were given a million dollars?

Where would you put your money?

Would you put it into surgery?

Would you put it into treatment hospitals?

Would you put it into prevention programs?

Where would you put your money?

Done by the World Bank, WHO, population reference bureau and centered at the Fogarty, this report came out and behind the report was this graph, which should be incredibly encouraging to all of you, it shows the aging of the U.S. population.

If you're Japanese today, you can expect to live about 85 years.

An American, somewhere between 76 and 85, and in all the areas of the world, life expectancy has gotten greater.

Let me explain to you...
what

this means in real terms.

If you were born in China, 1960,
your life expectancy was 39 years.

In the year 2000, your life expectancy, 71 years.

Okay? So the Chinese have gained eight years for the last four decades, okay?
The longest, largest prolongation of human life in the history of humanity.

What does that mean for disease patterns and priorities?

40 years ago, cancer wasn't a problem in China, because many people didn't live long enough to get cancer.

Today, if you're a smoker, cancer will kill an estimated third of the Chinese population by 2050, so as the population ages, cancer, heart disease, genetic diseases, obesity, traffic accidents will all take a huge toll on the population and the infectious diseases in that setting will become less significant.

The only place where prolongation of life has not occurred in the developing world is in Africa.

And it has gone down.

By 1992 it had gone up to 62.
years, 63 years, it's peak.<br/>
And from 1993 to today, 2004,
it's dropped 18 years in the last 12 years, the biggest decline<br/>
in life expectancy outside of war.<br/>
Okay? So clearly HIV has to be reckoned with as a major force<br/>
in population dynamics and in development.<br/>
Well, this means that when we think about the best buys in this disease control priority project, some have an infectious basis like stopping the AIDS pandemic, and tuberculosis, malaria, some that are very cheap are combating tobacco use, reducing injuries, reducing deaths from cardiovascular disease.<br/>
So we really need to think about new strategies for public health and global health as we think forward.<br/>
And the website for this book, it's a 250 dollar book, but you can get it for free by downloading it from the website and reading the chapters that you want. DCP2.org. Lancet said in the October issue, health is now the most important foreign policy issue of our time. And I was struck by this, because here we're doing global health. Foreign policy, global health, today? I mean, you think of
Glass.txt

different<br/>
things for foreign policy.<br/>
And then I began to think,

and actually,<br/>
in this administration

there's<br/>
been the largest investment<br/>
in major overseas programs

of<br/>
any administration ever.<br/>
The PEPFAR program committed

15<br/>
billion dollars to treatment of AIDS.<br/>
The President's Emergency

Program for AIDS<br/>
Research, AIDS relief, 15 billion dollars<br/>
over five years to introduce

anti-retroviral treatment throughout Africa.<br/>
The president's malaria initiative, 1.2 billion<br/>
dollars for malaria bed nets and treatment<br/>
in Africa, efforts to

control<br/>
emerging infections in avian flu.<br/>
So there have been tremendous investments,<br/>
even by this government in global health.<br/>
So where's this led us?<br/>
We also have worked

intensively<br/>
with the Indians and the Chinese.<br/>
These were countries, that

40<br/>
years ago, were impoverished.<br/>
And today, they're major economic middle income<br/>
countries with funds to invest in research.<br/>
And the Indians and Chinese are<br/>
both investing heavily in research.<br/>
What they need are ideas and
direction.<br/>
And so we have lots of collaborations with both the<br/>
Indian government and with the Chinese to enrich

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research priorities in health areas where we can all benefit. Here's a group of Iranians. We had a delegation of Iranians who came to visit NIH. Arash Alaei was the leader of the delegation. We discussed what are we gonna do with research in Iran? We think about Iran in different terms, as you know. It turns out that they are a centerpiece for surveillance of extremely drug resistant tuberculosis. It's the newest pandemic on the planet, tuberculosis strains that resist all antibiotics, so if we had it here we would have a hard time stopping its spread or getting rid of it. No antibiotics work. In Iran they form a window on the surrounding countries, Turkmenistan, Afghanistan, Pakistan. They get refugees in and they have the diagnostic ability to make, to identify extremely drug resistant TB, make a diagnosis and think about clinical trials when new antibiotics. If we wanna stop XTB in the world, we have to open up our eyes to all sentinels. And so whether this is in our own self interest to know where XTB is, or because of the
possibility of research opportunities
to test new antibiotics, this would be a place to go. So even in places like Iran, there're opportunities for research. Well, Fogarty, I said, is not a rounding error of our budget, it's a, we have a budget but because it's small we have to work with all of these partners. And it's really through partnerships with all the money that's now going into global health that we can provide some direction and some leadership. We have foundations like the Gates and the Wellcome, the private sector, multinationals working overseas, government agencies, universities, and the like, as well as our own institutes on the NIH campus. So we are really trying to help, from our leadership and coordination for these global efforts. Dr. Zerhouni, when he recruited me, is an Algerian by birth. He speaks French and Arabic and is really committed to global health. And so I was delighted that he has taken this upon himself as a mission for the future. My own experience, will this help? When I went to Bangladesh in 1980, under five mortality was about 120 per 1000. One in six or seven children died.
before they reached the age of five. Family size was about six and there were over half a billion dollars invested to no real avail. There was not having an impact. Immunization coverage was under five percent. Lots of diarrheal deaths and ARI deaths due to malnutrition. It was a terribly poor developing country. I've been going back every year or two and working with Bangladeshis. In 2005, the pattern is quite different. Under five mortality has been reduced almost in half in 25 years. Family size has gone from 6.3 to 2.6. how did that happen in 25 years in a society where women have been kept indoors. they didn't go out after menarche. they stayed at home, they were uneducated. What happened? One thing that happened was that women entered into the garment industry at the age of 13 to 21, they had a job, they had a reason to be with other women, to talk, they had healthcare on the job, they had a reason not to married at 13 because they had a salary. They had a reason not to marry a man who didn't have a salary. They had a way to say no, because they were empowered by a little money.
They had a reason to delay pregnancy until they really wanted to get married.

So I've seen this major change in Bangladesh society in 25 years, just watching. It's been nothing less than a real miracle.

Diarrheal deaths have come down. Women only have two or three children.

And the causes of death are changing. And some of these chronic diseases are becoming important.

So now, at Fogarty, we're involved in our strategic plan and it really is based on my own experience, as I told you, from Bangladesh. First, that we really see what is critically important is to train the next generation of American and foreign researchers.

And this is what I call early childhood education. This is all of you in the audience. Okay? There is a future in global health.

There's a lot to be done in the developing world, and I would encourage you to seek opportunities, which are becoming more numerous, and funding, which is skimpy, but which is available.

Because these are
opportunities that'll change the way you think about the world. We wanna build sustainable capacity for health science research in overseas, building centers of excellence.

In your group here at UGA are working intensively, for instance in Kenya on parasitic diseases. And those centers of excellence will be wonderful places to be mentored for research careers.

Implementation, we have lots of tools in science that we don't use, new vaccines, an understanding of the hazards of smoking, how to control hypertension, how to treat Burkitt's lymphoma.

All of these need to be implemented if we're going to have their impact. If they don't come out of our tool chest, they're not of great use.

We're trying to provide reentry support for foreign scientists to go home and make an impact in their home countries.

Training, institutional capacity, and providing leadership and collaboration for the future. Well, Tony Fauci, head of allergy and infectious disease has always said why do we get involved in global health, why should we be interested? And he presents this slide which is very important of
all the emerging infections that have arisen around the world which are a threat to the United States, to our homeland and I've scratched my head with this because this is clearly a high priority.

But beyond that when we think about genes, if you look around at all of your neighbors and students here.

400 years ago there were very few Americans in Georgia, okay, all of us brought our genes from Africa, from Asia, from Europe and it's those genetic diseases that we're now understanding for many of the illnesses in our society today.

If we're going to understand these genetic diseases, it's really through global health.

If you think of one in particular, Huntington's chorea, a terrible genetic disease, spread in family, a dominant gene.

Where were the genes identified? Venezuela, offspring of a single woman who had Huntington's genes who went to Venezuela in 1824 and has had several thousand offspring.

infected and expressing the disease or not infected and it's by understanding the gene in this type of population that with the sequencing of the human genome we've actually been able to identify the gene.

begin to think about what
we could do about the disease. When a therapy becomes developed and available for testing, Maracaibo area of Venezuela may be one of the first places to have an impact and see if it works, they are genetic diseases. How about environmental diseases? You know when I worked in Bangladesh on that tube well, remember the tube well? We put in the tube well to stop cholera. It turns out that a quarter of those tube wells have high levels of arsenic in that water, heavy metal, that's a poison. We never thought of this 25 years ago, but with arsenic in the water, if we ever want to study a problem of chronic arsenic poisoning and figure out how to address it, to cure it, to remove arsenic, to remove the risk in the water. Bangladesh is where we would have to go and this is true for many other diseases. Remember the problems in Bhopal with Chernobyl with the radiation disaster. Where disasters occur, we can actually learn a lot about the diseases that will be important for those people as well as for ourselves. And of course adult cancers that I just shaded in the Burkitt's area red and as one of many cancers which have high incidence, high incidence areas, where by going to these areas and studying high risk cancers,
we can understand the etiology of the cancer, whether it's genetic or environmental and we can think about new modes of treatment. 10 years ago the Institute of Medicine came out with a report on America's Vital Interest in Global Health. We're back with the IOM updating this report because much has happened in the visibility of global health issues in the world today.

We think that global health is now at a tipping point, a time when major things will happen because so much has changed in the society. The introduction of the Gates funding and the other foundation funding, of the rise of India and China as contributors to global health research, the visibility of global health problems, the idealism of youth that we can really make things happen in global health as we've never seen before. So some themes for Fogarty, we've been working on our strategic plan, one is that science anywhere helps people everywhere. Do you like that one or should we try the other one, take science where the problems are or science for global health? We're having an award for whoever comes up with our best brandname and we're trying to get our strategic plan done by June or July of.
this year, so any ideas will be accepted for brands and we'd be happy to see them.

This is my, I've lived in Georgia for 30 years and this is my first visit to UGA. So I want to thank all of you crazy people who invited me here to speak to you, I'm really delighted to be here and I'm amazed at the quality of the research and the efforts that are going on in global health. I wish you well and I would encourage all of you to go over to that department and see the dean and make sure you sign up for some kind of a project in global health and most important, go overseas to some project or some place where you can actually learn from your experiences. Thanks so much for letting me speak with you.

[Applause]