ALBERT EINSTEIN COLLEGE OF MEDICINE OF YESHIVA UNIVERSITY - COMMUNICATIONS

D.C. Briefing on The Global Diabetes Epidemic

Washington, D.C.
September 27, 2010
Hello and welcome. Thank you for coming.

What I'd like to do is to begin by very warmly thanking Representative DeGette's office, Representative Castle's office, and Representative Christensen's office, a tremendous help from the staff, and what a pleasure it is to be able to be here to present to you issues related to the global epidemic of diabetes, and then to present some very specific issues related to what some of our folks are actually doing on the ground in various countries. I will begin. There'll be four speakers in all. I'm Meredith Hawkins, and I direct the Global Diabetes Initiative at the Albert Einstein College of Medicine. And what I intend to tell you is as many of you are no doubt aware, we're dealing with an enormous epidemic of diabetes in this country.
I think that's no surprise to any of us. We're all very familiar with people that we know well who are affected by diabetes, and we're also aware that it's on the rise. I think we're all very familiar with statistics indicating a 70% rise in diabetes projected over the next 20 years. What I'm doing by showing you this global map is to show you what is projected to occur. It'll be now over the next 20 years, and the numbers that you're going to see are the numbers that were known for 2000 which are shown in the light-blue bars relative to the projections based on World Health Organization for the year 2030, that is if nothing is done in the next 20 years in order to stem the tide. And so what you'll see, again no surprise, that in North America we're seeing a projection of about a 70% rise in the prevalence of diabetes, but what may in fact come as a bit more of a surprise is not
only the rate at which people are developing diabetes in other countries, but the projected increases in those parts of the world. And so for instance we'll be hearing later from Dr. Mahmoud Ibrahim who directs the Egyptian Diabetes Center. You'll be seeing what is the case in the Middle East where there's a projected 164% rise over that time period. India, number one in the world for diabetes, we have Dr. Nihal Thomas representing us here. Not only are they currently number one in the world, but there's a projected rise of 150% above what is currently the case. I'd like to point you to the numbers at the bottom. The fact that it's predicted that there will be over 366 million cases of diabetes by 2030. Now let's compare that for a moment to the prevalence of HIV/AIDS. We're very thankful that things seem to have leveled off at a plateau somewhere.
between about 30-35 million globally.

So if we put that in perspective, what we're looking at for the projected prevalence of diabetes would be more than 10 times that.

Now it will be one thing if diabetes were a benign condition. The problem is as so many of you know well, it is by no means benign. The problem also is that in these developing countries where there is limited access to healthcare, the complications of diabetes are particularly devastating. So a couple of facts to introduce you to the concept of global diabetes, number one that 90% of new cases of diabetes will be occurring in developing countries. So let's just pause for a moment to tackle the enormity of that fact. When I go to diabetes meetings in this country, I'll still very frequently hear someone get up and say, "Well, this diabetes is a problem of the
developed world." I think that we need to embrace the reality of the fact that in fact it's much more the case that this is a disease of the developing world. Now these are statistics that I find to be particularly heart rendering. We know of course that a young person developing Type 1 diabetes has a challenging course ahead of them, and so for a young person developing Type 1 in this country, their life expectancy is likely to be decreased anywhere between 10 and 15 years relative to what it would have been otherwise. And that is, of course, a very serious and a very sobering statistic. But I'd like to contrast that with rural Mozambique where if a person is diagnosed with diabetes and is told that they will require insulin, their life expectancy from the time of diagnosis is on average about one year. Now what exactly is going on? What types of diabetes
are, in fact, occurring in these countries? One of them for sure is Type 2. Now we think of that in our minds as a disease of affluence, as a disease of excess, and as a disease of the first world. Well, the reality is in the slums of so many of these countries, people are now having access to the bad foods, and amazingly enough, around the world just like in this country, the bad foods are cheap. Those saturated fats, the cheap, empty calories that we call them, the sodas that are now being available that are cheaply produced in all of these different countries. Cheaper than clean water. So up here we have a picture of two women in Johannesburg at the local McDonalds, and we're not targeting McDonalds by any means, but what we're seeing here is the fact that as we itemize the points here, we're looking at the impact of Westernized diets, of the input of refined
sugars, calorie-dense foods, and prepared foods. Now the prepared foods are one thing, if you're not even in the level of affluence to be able to afford prepared foods, you can still go to the marketplace in the slums and buy a very poor-quality cooking oil. In fact, this would be the oil that was left after the higher grades had been sold. You can go home and fry your food over and over again in this and along with the sugar, this contributes to diabetes. What we're seeing as well is the sedentary lifestyle, so that a generation ago in all these parts of the world, people were out working in the farms. A generation later, they're sitting in the marketplace selling goods, or they're sitting in factories producing those goods. We're seeing a very rapid shift in lifestyle.

What's interesting is over on the right is a challenge that I have to
face a lot in these countries, and that is overcoming cultural beliefs that being overweight is a sign number one of prosperity, number two of beauty, and number three, a sign of health. And can any of you think of why it would be seen to be healthy as it were to be overweight? So in countries like Uganda where we do a lot of work, what would a very thin person perhaps have? AIDS. So that the presence of overweight is felt then to be a sign of good health and not having HIV/AIDS. And then finally at the bottom, and this is why it was wonderful to have representation from, from many different caucuses because in fact it's only the Caucasian group that is relatively protected. Every other population group other than Caucasians is at increased risk of developing Type 2 diabetes. So this is Type 2, and this is definitely a major issue in developing countries,
but my experience has been having the opportunity to teach at many global medical education meetings where there's representation from many countries of sub-Saharan Africa and also from Asia. What I've been hearing repeatedly is that there is an epidemic of diabetes among very thin people. In fact, this has led us to come to understand that there is an entity, you could call it lean diabetes; people who are malnourished from the time of childhood, underweight, they develop diabetes which is different from Type 1 or Type 2. It unfortunately is very poorly understood. What we do know is that they do very poorly. These people develop severe complications, probably vitamin deficiencies contribute. They succumb at very early ages to complications. This is prevalent, in fact, in many parts of India as well as in sub-Saharan Africa. Very
little research has been done. As a consequence, the people on the ground caring for these patients don't know how to manage them. Because they're young and thin, they often get insulin. They go home, don't have enough access to food, and many of them succumb then to low blood sugar, and we hear reports that they've died in the middle of the night. I've told you the facts. I'd like to now just present a couple of faces, the real-life situation. On the upper left a 15-year old boy with a widowed mother had been wasting away for three years, but his mother couldn't get him to the doctor. We happened to diagnose him with diabetes. He got started on insulin, people gave him many supplies, died four months later in the middle of the night. Very common scenario. Upper right, 27-year old single mother developed diabetes 10 years earlier, came in with a thigh wound,
and was found to be in end-stage kidney failure. Was not one of the 20 people a year that was fortunate enough to get dialysis in Uganda. She died one month after the picture was taken. At that time was in such severe pain, having such severe chest pain the only relief she could get because she couldn't afford medicine was to pound the mattress with her fists. At the bottom, 15 year old Isaac, an orphan who's selling his insulin in order to buy food for his grandmother. And so this brings us to why we have a global diabetes initiative whereby we hope to combat the global diabetes epidemic by building strategic global partnerships in research and education about which you'll hear more from the other speakers. And in fact our significant partnerships are both within North America as well as with Makerere University in Uganda, Christian Medical College in India,
then the opportunity that we've had to participate actively in these international medical education meetings which alternate between Kenya and Thailand whereby we're able to educate people in multiple countries around Asia and sub-Saharan Africa about diabetes. And then Christian Medical College. The beauty there being the sophistication of the research methodology. We are therefore able to do studies at the Christian Medical College in which we're able to in a very sophisticated way zone in on the metabolic abnormalities in these people with lean diabetes. The ultimate goal is to determine what, in fact, would be a safe and cheap treatment for them to avoid the insulin that sadly is so often the cause of their death. In Uganda, just to conclude, we've had thankfully a very successful medical
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<td>an education program partnering with the medical school to train specialists in diabetes, and then bringing in doctors and nurses from 20 clinics and hospitals all around the country in order to provide education. Following one of these programs, this is a very jubilant graduation ceremony. So what I'd like to do now is to bring Dr. Nihal Thomas, who's a Professor of Medicine at CMC Vellore in India who has developed an incredibly program both in medical education and in research.</td>
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<td>DR. NIHAL THOMAS: Good afternoon, and at the outset, I'd like to thank Dr. Meredith Hawkins and the members of this body for giving me this opportunity to talk to you. I'm going to talk about how we combat diabetes in India, and I call it the Vellore model. The story begins about 110 years ago when an American philanthropist by name Dr. Ida Scudder [phonetic] came to Vellore...</td>
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which was in fact a barren land. And

she set up a one-bedded hospital at

that point of time. Following that,

over the last 110 years, it's

actually grown to be a 2,600-beded

hospital, and it has around 1.5

million outpatients a year, and

around 120,000 inpatients a year,

with patients coming from all across

the country. We do a significant

amount of research. A number of our

grand buildings are supported by

partial grants from this country and

we also have a bit of research which

is guided by the NIH. This is a

program called Spades where we

actually did surveys of schools in

rural and semi-rural areas across the

country looking at the prevalence of

glucose problems in children. And we

found that the bad--the good

cholesterol, that is the HDL, was

actually low in almost 60% of males.

You know that Indians parents

actually drive their children to go
to school and study very hard, and don't give them much exercise. And so that's probably the reason. We also had a problem with elevated sugars, not in the diabetic range, but in the pre-diabetic range of almost 20% before the age of 20, and that is a big problem which would spell a huge problem with cardiovascular disease as well as diabetes later on in life. This is some of the basis—Meredith has shown you the slide with regards to our research. It's looking at the possibility of diabetes being caused by low birth weight, and this is a known fact, but we are not sure as to why it happens. About 26% of individuals in our country who are born have a low birth weight, and this is a big problem. And you can imagine as they grow up being exposed to unhealthy lifestyle, the propensity for developing diabetes is huge. Next slide. This is on the
India-China border about something like 2,000 miles from where I am sitting, but we did a few surveys in the northeast states which are close to Burma, China, and Bangladesh. And you can see over there, that's a height of 11,000 feet, but as you go a little higher to around 14,000 feet, you actually find that soft drinks are available, and there's good evidence of Coca-Cola colonization. As Meredith had mentioned to you, good food is expensive, and bad food is cheap. So the high-calorie food costs less and the low-calorie food. An apple a day keeps the doctor away, but it's difficult to get an apple for an Indian person. This is the program which Meredith was talking about where we have actually trained 100, and of course in excess of that at this point of time, hospitals from various states across the country, including particularly the eastern
health facilities are not as good, and the northeastern part of the country. And we're focused in training doctors, nurse educators, foot-care technicians, and orthopedic cobblers as well. You might ask why train a shoemaker? Because foot problems and ulcers and amputations are a huge burden in terms of morbidity, as well as cost for patients who have diabetes. And if you can prevent them with good footwear, it's actually a big bonus. So we asked them to set up integrated diabetes clinics. These are charitable hospitals across the country in remote and rural parts by and large. Next slide. So the model was to set up as far as possible something close to this model. Not every place could get the entire picture absolutely correct, but to the extent possible. Have a nurse who's in charge. The nurse is in charge, not the doctor. The diabetes
educator, diet counseling, physical exercise by a physical therapist, eye examination, foot care by a technician who need not have the highest of education. You know, someone who's just past the 10th grade, and who would like to actually do this technical work would be suitable. Laboratory quality control. That's very, very important. If you do not have a good laboratory quality control, your results will be wrong. So CMC, Christian Medical College monitors the laboratories in these hospitals. As well, there's a quality control program which covers about 2,500 hospitals in the country. Pharmacies having essential and cheap medicines not necessarily the best, but the cheapest which is effective, and that is what is important in all these pharmacies. To gain community support and also to have prevention and awareness, supportive outreach
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photographs, they have gone and done evaluations in Karnataka in the south. Next slide. This is a foot-care technician from southern state of Kerala. We are now continuing to get funding from other bodies as well, and I must thank them a lot. This is an American body, it's called Project Hope, which has now got a target for training 200 counselors per year within our center through distance education as well as three contact programs over a period of six months. Next slide. The material that we have developed has been now used by book that is well circulated and we have distributed almost 30,000 copies in the country in the first edition. We also have video tapes and modules, and there are PowerPoint presentations for doctors. It's under public domain. Anyone can download it. Knowledge belongs to everybody. Next slide. We do a lot
course is a program in connection with World Diabetes Day where we have quizzes for the children telling them as to what a healthy lifestyle is, and getting that inculcation of just 20 or 30 minutes of exercise per day being important for them, on a long-term basis. Next slide. Cookery competitions, good for housewives, and so we have periodic cookery competitions to impart the knowledge of a healthy diet amongst housewives. Next slide. Dancing for diabetes. Dancing is popular in India, and, but we stop dancing by the time we are 25. So we were just suggesting that maybe healthy for all of us to join in the dance maybe after this program. But this is for diabetes. The next slide. We believe that women play a very important role in health education. Ida Scudder started the hospital and it was purely a medical college for
women ’til 1948. Subsequently, after 1948, people like--

DR. HAWKINS: [Interposing] They lowered the standards. Sorry.

DR. THOMAS: Yes. People like us infiltrated, but even now I do believe the current batch had about 60% females and 40% males. We have a large nursing course which trains a large number of nurses, and we have nine full-time diabetes nurse educators. Now besides imparting knowledge to our local patients, they do a lot of training of the trainers, and we hope there's downstream training right across the country with the nurses who actually do this work. And they are absolutely vital to the way we function. Next slide.

I'd like to thank you for your patience, and I'd also like to acknowledge people who have helped us over the year, the World Diabetes Foundation in particular, Albert Einstein College of Medicine, and
other funding bodies like Project Hope, and supporting universities as well across the world. Thank you for your patience.

[Applause]

DR. HAWKINS: Thank you, Dr. Thomas.

I would like to now introduce Dr. Paul Robertson, Professor of Medicine at University of Washington, Director of Pacific Northwest Diabetes Research Institute, and chairing now the Global Diabetes Alliance about which he will be telling you.

DR. PAUL ROBERTSON: Thank you very much, Meredith. I'd like to take us to America now to focus on our own country a little bit. Next slide. This is greetings from Seattle, obviously, by the first slide, but also the American Diabetes Association who supports this greatly. And finally, I'll say a few words about the Global Diabetes Alliance.
Alliance which is a new organization.

Next, please. Next. This first slide represents what diabetes looked like in 1994 in terms of statewide distribution. Next slide.

This is how it looked in 2004. Going from blue to red means increased prevalence, so you can see in a decade how much the disease has invaded the country. We're not sure what's going on in Colorado, but they're a very healthy group of people. We need to look to Colorado for leadership. Next slide. How common is this disease? Well, this number keeps rising it seems like every year. Right now we're greater than 25 million people with diabetes and new diagnosis every 21 second, every 15 seconds, it depends who you read. Next. But greater than 10 million children, young adults have Type 1 diabetes. That only represents 5-7% of all diabetes.

Next. Seventeen percent of all
Eighty years old is not so old anymore. We expect that for life expectancies for men and women, so that means about that time that almost 20% of us will have diabetes. Significantly, 5% of pregnant women have gestational diabetes which is replete with all kinds of problems with the development of the fetus. Next. Obesity. We're hearing a lot about obesity. Obesity is part of the problem here. If you just look at the bar grams on the left-hand side, 6-11 year old kids are coming to the point now where 12% of them are obese. And this again, these are old data. Twelve and 19 year old kids it's up to 14%. So obesity is an increasing problem with this disease. Next. Who has it in our country? Next. Non-Hispanic whites, that's most people in this room, 7.8% is the prevalence. Hispanic Latino, 10.2%; non-Hispanic African-American, 13%,
so it's just getting worse and worse.

Next. American Indians and Alaska natives running about 15%. In fact, it's interesting, next, to go into old western art, photographic or otherwise, you don't see an obese American Indian. So in 18--what is this, 1860s, Kit Carson on your left who you know very well I'm sure, but you probably don't know very well is this Navajo Indian leader of the group of people Kit Carson put in Canyon Duchay [phonetic] in Arizona. They were then moved out of there, put on reservations, and we all know that story. Bringing them white flour, bringing in alcohol, making people sedentary, and you get to see a very obese American Indian. It's just a message about what environment can do to people who are not used to Western style food or living. Next, please. How severe are the secondary complications of diabetes? Why do we care about this disease? Well, it's
the most common cause of blindness,
kidney disease requiring dialysis,
and non-traumatic amputations in this
country. That's a lot of morbidity.
Stroke and heart disease are two to
two times more common in diabetic
patients than non-diabetic patients.
What does it cost us? This is an old
figure, but when I made this slide,
it was 130 billion every year to take
care of people with diabetes in the
United States. Ten to 14% of USA
healthcare dollars are spent annually
to care for people with diabetes.
This to me is a very sobering fact.
There's a 200-to-1 ratio between the
amount of money we spend on care and
the amount of money we spend on
research to understand this disease
better so we don't have to spend so
much money on care. There's no
American business that would thrive
with this kind of ratio on research
and development. Next. A few words
about the Global Diabetes Alliance.
This alliance began in Seattle three years ago. This October it's our third anniversary. Next slide. We came together to do a couple things. We wanted to learn from each other about diabetes as it occurs in all parts of the world. We recognize that diabetes in America is not diabetes in India, it's not diabetes in China, it's not diabetes in South Africa. Every country has their own flavor of Type 2 diabetes so the generalizations that we have been teaching ourselves are not--are just not inclusive enough. There are many people who are lean who have Type 2 diabetes who do not eat improperly, who are very active and eat foods. There's something else going on that's responsible for the epidemic. The reason we wanted to know all about this is we wanted to design very brief research protocols that could be used throughout the world simultaneously. If you look in the
literature usually what happens is, in one country a given test is used to study diabetes, and in another country a different kind of test is used, and in the third country, a third different test. We need to measure all the same things all the time and let the countries themselves be the variables rather than having two variables: different people, different tests. So that's what we're dedicated to, and this organization is preparing protocols. In fact, has now prepared protocols to distribute throughout the world for people to use. They've been peer reviewed, they're exactly the right thing to do, and they're cost effective. They're not so sophisticated that they can't be used anywhere. Next slide. Obviously to do this we're doing this so that people in those countries can get funding from their own countries. It's not a good paradigm to expect
the United States to provide money all over the world for them to do research into their own people. We think the more pragmatic approach is educate the physicians, the researcher in each country so they're empowered to go with the information to their own governments to get their own funding locally, and then conduct their own research. They'll be much more effective at it than we will anyway, because it's their culture. It will take us decades to get into cultures to study--for us to study those people. So it's better that our collaborators do it. Next slide. This last slide just shows you the little, the yellow stars here represent the membership, the governing membership of the World--of the Global Diabetes Alliance. We purposely chose people all over the world except for Antarctica. We don't think penguins get diabetes so we left that alone. But for the
other six continents where these stars are are where members of our steering committee come from. They're very well-known clinicians in their own countries. If you look at the star in Egypt, we have that star sitting right in front of me here who's going to come up next, Dr. Mahmoud Ibrahim who's going to be the local organizer for our second Global Diabetes Conference, and that's going to be in Cairo next month. So Mahmoud?

DR. MAHMOUD IBRAHIM: Thank you.

[Applause]

DR. IBRAHIM: Thanks Meredith and Paul for this unique opportunity. I don't think we can discuss diabetes in just half an hour or so, but it's a unique opportunity we see of this and you see ours and from here we can start. Next. I have been born in the late '50s, and if you were born at the same time, so your chance of developing Type 2 diabetes could be
as low as maybe zero because at that time, one out of 12 could develop Type 2 diabetes in the future life. However, over time and for those babies born on the year 2000 onwards, the chance of developing Type 2 diabetes in the future will be one out of three. Not only that, but for those whom will be born within 10 years or 15 years, the chance could rise up to one in each couple of babies, next, please, especially in non-Caucasian population. The globalization of the fast food in our area, in Egypt and in Arab countries, is even worse than America because in our area, everything could be delivered to your home, which I believe is not the case in America. Next. I'm just asking you can anyone guess, this photo was taken in 1969, like 40 years ago. Could anyone guess which Arab state was this? FEMALE VOICE: Egypt?
DR. IBRAHIM: No. Okay. Let me show the same location after 40 years.

MALE VOICE: Ah, Dubai.

DR. IBRAHIM: It's Dubai, yes. And as you see, next please, there was a market, and the dramatic urbanization to extent, to the extent that some guys were not even able to adapt so you see this fantastic mix between the old and the modern. Next. And this is really, really a very strange photo to our community. We spend, like, decades, we cannot see this American type of obesity in our community. Next. So again, as stated by Paul, we are going to host the Second Global Diabetes Alliance in Egypt. I would like to welcome you all to Egypt, and as you see, Egypt is not the land of pyramids, Egypt is a fantastic mix between the old and the modern. So welcome you all to the Second Global Diabetes Alliance Conference. Thank you.

[Applause]
DR. HAWKINS: Thank you Mahmoud. Now we have a bit of time for questions for anyone who is able to remain, and we can call up various of the speakers. I think actually would you all be able to come up? And then we would be happy to answer questions.

MALE VOICE: You kind of on race, what's the breakdown by class.

DR. HAWKINS: This is, yes, this is an excellent point. There is indeed a striking difference by class. I'm not, I cannot at my fingertips tell you what the numbers are. I'm wondering whether or not our New York colleague might be able to tell us. At any event,

I'm not sure what the actual numbers are. I'm guessing maybe three to one, but it is indeed a very striking difference.

MALE VOICE: Being that less.

DR. HAWKINS: Exactly. Meaning that the--exactly. Meaning that lower socioeconomic status is associated
with a marked increase in risk for diabetes. And there has in fact been a variety of thoughts as to why that is. We've talked about nutritional factors. Certainly the issues of the bodegas in these local neighborhoods and the lack of fresh food, fresh foods, and very similar to what Dr. Nihal mentioned in India. The fact that the bad calorie-rich foods are very cheap and so on. There's also just the stress of life, and, the decreased sleep. There's a lot of different factors that have been speculated probably to be involved.

FEMALE VOICE: Is anyone doing research on -- factors? So say people who are maybe morbidly obese, and yet do not develop diabetes?

DR. HAWKINS: Yes. That's an excellent question as well. In fact if anyone would like to address that, but that is in fact an active topic of research because there are many
DR. IBRAHIM: Well, by evidence Type 2 diabetes is a preventable disease, and from here we should start. Actually, yesterday I was back from Stockholm, I was there for the European Conference on Diabetes. And the closing lecture was delivered by a guy from Japan. His English was terrible, but his lecture is fantastic. And he did describe, like, three mechanisms and three receptors for obesity as a cause of insulin resistance, and consequently for Type 2 diabetes, and for the gene responsible for the size of the fat cells and the number of fat cells. And from here we can achieve a big improvement if we're going to tackle those stuff responsible for obesity. So obesity and lifestyle is a key, and again, prevention, prevention, and prevention.

DR. ROBERTSON: So that being said,
we have to return to the theme that obesity does not cause Type 2 diabetes. Type 2 diabetes is by all good bets a genetic disease, it's within families. It's not a disease, it's more of a syndrome. Type 2 diabetes is more like headache. We know what it is, we can recognize it, but even in our own country 20% of people with Type 2 are lean, have never been fat, have never had insulin resistance. There's something else going on. Geneticists like to refer to this as epigenetic factors. There are things in our culture other than food, other than improper food, other than lack of exercise that are increasing the prevalence of Type 2 diabetes. What are they? We don't know. There's great concern about how we make plastics, what's in the plastic what we consume all the time, what we breathe all the time. So we have to broaden our
It's so pat to say, and you weren't saying that, but what I hear all the time is, "People have Type 2 diabetes because they're fat, it's their fault. We don't have to worry about that." That's so cruel, because first it's not true, second, it's totally inhumane. So that's why, again, from a global point of view, we're trying to get people to understand the path of physiology or the causation of Type 2 diabetes in everybody's country, because chances are it's going to be different all over the world.

DR. HAWKINS: Thank you.

FEMALE VOICE: Have you had any clues as to the etiology as opposed to physiology — — .

DR. HAWKINS: Okay. So to repeat the question, there was a question about whether or not we have any clues as to the etiology or the causality of the lean type of diabetes, and in fact, we have some hypotheses but
we're actually currently conducting the research to decide whether or not any of these hypotheses are true. Number one is the fact that when you encounter people with a very rare genetic syndrome called lipo atrophy, or lipo dystrophy where they don't form fat, what happens is they're very prone to diabetes and so you have a spillover. Any fats in the diet gets spilled over because they don't have fat cells to make a holman [phonetic]. They basically spill over into the muscle and the liver, causes severe resistance to insulin and diabetes. So this is a genetic model that looks, shall we say, phenotypically it looks visually to be very similar to what we're seeing with the lean diabetes, people without fat. So that's one hypothesis. Another is we know for sure that these people often have had chronic infectious diseases. Many of them present with TB and other
serious infections, and certainly we do know that the process of chronically fighting infection, that chronic inflammatory process makes people resistant to insulin. That could be a factor. There's also stress and stressful life events. Many of these young people have just lost a parent and other, other factors like that. We certainly know that the "stress hormones" that the body produces to respond, we know that they tend to produce diabetes. So there's many possibilities. There's also some—we had a chance to meet this morning with some folks at NIH, and we're very much aware that another whole focus of research is gut bacteria and the relationship that they can have with diabetes. So there's many possibilities, and we're going to try to sort that all out. By the way, just pointing out that our Einstein website is up here. I'm
putting it up there because we will be putting a transcript of today up there, but also other information related to global diabetes. You had a question.

MALE VOICE: Yes. I kind of - - you're not just seeing an increase in cases of diabetes or Type 2 diabetes, but an increase in genetic vulnerability to diabetes?

DR. HAWKINS: So this is a great question because everyone had the same genes, of course, generations back. We often have people presenting that say they have no family history. Clearly, the people generations before had no diabetes. Their lifestyle was very different so they had the genetic vulnerability, it's now becoming manifest very rapidly. I think back to the other question about, about good fat and bad fat, there are many individuals who are very healthy obese. A lot of it is probably
factors that we're only beginning to understand. Larger fat cells are probably an issue, there's many different factors. How inflamed that fat gets. Whether or not there's inflammatory cells that go into it. Many different factors that probably contribute to some fat being healthier, and of course where you put it on your body. On basically peripherally or on the arms and legs as opposed to around the middle. Yes?

DR. THOMAS: I'd just like to add to what Meredith said, and obviously genetic changes, you'd expect years or maybe even centuries to take to occur. But it's a phenomenon of we talked about low birth weight, and also they show about -- diabetes probably being a combination of apples and oranges, and low birth weight being one of the causes. So during the intrauterine growth, you may have an effect which is called an
epigenetic influence. So there are certain chemical changes which occur, and you may have these chemical changes change the genome structure, and that could actually lead to insulin resistance, and also reduce production of insulin. And this has been shown. The variability [phonetic] and the extent in different ethnic groups may be quite different, and so that's also something which we are studying, and is probably worth studying in different populations.

DR. HAWKINS: Thank you. Other questions? Yes.

MALE VOICE: Could you say a few words about -- NIH, what other foundations, foreign governments or private entities are funding, like, these research communities.

DR. HAWKINS: Not enough is the quick answer. But basically, up until now, unfortunately, diabetes really just has not hit the radar screen as a
major global health funders, and on the flipside, the global side of diabetes hasn't necessarily hit the radar screen of the major domestic diabetes funders. But there are some, some heroes,
certainly, one of them being World Diabetes Foundation which is the one that has funded so much of Nihal's excellent work. They've also funded our partners in Uganda. They're doing just terrific work with people on the ground. But there are very few. International Diabetes Foundation is certainly doing work in terms of promoting the cause of diabetes, but there's very little in terms of actual bodies that are specifically funding the work right now. One of the questions I suppose that comes up is whether or not it would be appropriate for, let's say, NIH funding, and this was something that we chatted about today. The bottom line is that these
folks are moving here. I think that's a reality that we need to become very aware. They're living in these places, we're doing the research, and then, thankfully, in a very--the beauty of doing the research for instance with Nihal at CMC is in this era of fiscal restraint, it's unbelievably cost effective to be researching this condition where these people actually live. The fact that many of them are now starting to move here means we need to know about it, and it would be nice if we're a bit ahead of the curve on that. Paul?

DR. ROBERTSON: I'll tell you one--one success story that I work with the Snoqualmie Indians in Washington State, and they have just recently regained license to be Native Americans. It was taken away for awhile. They built a casino. In their first year, they earned--netted
$150 million. So now they're contributing to the global diabetes effort in Washington State to study the Snoqualmie Indians, paying for their own research. I think that's a paradigm we really need to think about worldwide is that if we make it interesting enough, and we can actually learn how to be trusted by cultures other than, the culture that most of us represent in this room, people will pay for their own research because they understand it's important as they watch their children get the disease, or they watch their elders go on kidney dialysis. So we don't always have to come to the government for the money. I think the idea is to ask the government to help us get the word out so people can help themselves. So we need to help them help themselves. Need to help the governor get a better microphone.

DR. HAWKINS: Well, thank you so much.
for coming. If there are any other questions, we'd be most happy to meet with you afterwards and discuss, but I'm so appreciative of your interest. Thanks, and have fun -- the rest of the day.