Thank you. This has been a very rich and exciting morning and I look forward to the afternoon discussion as well.

I'm going to talk a little bit about mechanisms and I won't get into methylation [laughter] in deep detail, but I actually think [laughter] there will be a test afterwards. [laughter]

I do think biological plausibility is important in demonstrating it's useful if we are going to leverage some of the healthcare dollars to address these factors. Once you can show the biological pathways, people believe it's more real somehow, even though we know those pathways have to exist; demonstrating them has been, I think, an important process.

And for community development project to affect health, they've got to operate through what we know are the determinants of health and, actually, Jim Heckman very nicely summarized those and set me up for my talk. This is from-- these are the data that he was referring to that came from a work at CDC and from Mike McGinnis [sp?] and RWJ in some more recent updates.

Basically, they identified five factors that measured the extent to which these each contribute to premature mortality. Now the five factors, and I'll be talking

a little bit about them are genetics, lack of access or poor quality healthcare, environmental exposures that are really on the hazard side - exposures to physical hazards like toxins and carcinogens, social exposure such as social isolation and health behaviors.

Now, let me just say, first of all, this is a wildly over-simplified chart and I would not take this as gospel in any way. For one thing, these are presented as separate categories but we know they interact with each other. So, you know, just starting with gene [?] environment interactions, the impact of a given environment will have very different affects on individuals depending on their genetic vulnerability, and as we heard this morning, and this is where we do get methylation, that environments can actually change the biology and the genetics; so these are interacting and it's a little hard to attribute attributions to just one or another of these.

They're also vastly over-simplified in their estimates of impact, so I wouldn't take any of these figures again as absolutely the right figures, but it gives you some degree of order of magnitude and you can begin to see where there are more opportunities for having bigger impact.

So, these factors taken together account for the causes of diseases that appear

on the death certificate. So, it says that people die of cancer or heart disease, but they're dying because of these factors that preceded the cancer or the heart disease. But if you pull back one more level, you'll see that there's another level of causes that affect these intermediate determinants, and these include the social and demographic factors that shape people's lives and the communities that they live in.

And actually, for the last 10 years, my colleagues and I, including David and Anna, and actually Gary Evans, who was mentioned this morning, spent our time in the MacArthur network on socioeconomic status and health trying to look at the mechanisms by which socioeconomic status gets into the body to affect health. And if any of you want to get deeper into this, we have a special issue of the Annals of the New York Academy of Science in February called "The Biology of Disadvantage" that summarizes our work.

Let me just indicate the basic findings. One is that there is a gradient and this is-- Lynn mentioned this. This was really prompted by the work in England from Michael Marmot and discovering gradients in the US. Almost every disease you find has a graded affect with social class. But the other thing is there is no single cause.

Almost all of the determinants of premature mortality are affected by SES [?] and it's not just one thing. Actually, as Melody Barnes was saying "People don't get up and say 'I'm gonna have a transportation day.'" They also don't die saying "I died because of X." It's the combination of events that create disease.

So, if we start with the determinants, healthcare, as we've said, is important but over-emphasized. It's estimated to be 10 or, at most, 15 percent of premature mortality due to shortcomings in healthcare. Much more of the action is who gets sick in the first place. Once you're ill, healthcare matters a lot, but if you can prevent the illness, you are far better off than even having the best healthcare. And, again, that's why this conference is so important, although development activities that increase access to healthcare services are important, there will probably be greater payoff, and now I know it's a return on investment, in the other domains.

So, let's look at the other domains. There's a lot of focus in the physical environment and direct exposure to carcinogens and pathogens. Again, this is important, but the direct affect is relatively small, estimated to be about five percent, however, if you think about the environment as the built environment that shapes the other determinants, particularly behaviors, the affect may be much, much larger. And that's what I want to get to is looking at the

interactions among these.

Let's talk for a moment about the social environment. On the negative side, social isolation is bad for your health. It has both direct affects and indirect affects. The direct affects is actually some biological pathways by which social isolation may directly influence processes that foster disease, but indirect affects are things that have to do with the resources people have for dealing with adversity.

So, for example, in Chicago in 1995, there was a heat wave that lasted about a week and 700 people died during that week. By and large, they were primarily older people living alone in un-air-conditioned apartments who were afraid to leave their houses or didn't know where to go. So, in that case, social isolation was as direct risk factor which could have been affected by different kinds of community designs.

On the positive side in the social environment, social support and social engagement contribute to better health and these are factors that, again, can be affected by design of communities.

Let me move to the biggest affect, which is, health behaviors. These are

estimated to account for about 40 percent of premature mortality and factors such as smoking, poor eating habits, lack of exercise and other health behaviors.

Now, there's a tension here. Those who focus on health behaviors risk blaming the victim. And from the Public Health perspective, there's a lot of concern that we're looking at the individuals and not at the environment; and Lynn talked this morning about some of the problems of doing that.

However, at the same time, it is still individuals who have to engage in the behaviors. They're the ones who need to stop smoking, who need to not take that extra piece of chocolate cake, no matter how delicious it is. [laughter] And so we need to think about individual motivation in even the best of environments.

Currently, different approaches are taken by those who look at the individual and those who look at the environment and we're going to be so much more successful if we bring these together. Right now, we tend not to read each other's literature. We tend not to even attend the same meetings. And so, this meeting, again, is extremely helpful in informing this effort.

Let me give you one example of how understanding the biology may help inform even community development projects and which might be most effective. And one of our network members is Sheldon Cohen [sp?], who does work in psychoneuro [sp?] immunology. He does these wild experimental studies where they take healthy volunteers and spray rhinovirus up their nose and then see who becomes infected. It turns out [laughter] even if you have a rhinovirus sprayed up your nose, only about 60 percent of people actually get an infection, so it's a good model for the robustness of your immune system.

Well, what he has them do is to fill out a whole bunch of psychosocial measures before they get the spray and we know that life's stress contributes to this, but so does childhood SES. He asked people about their childhood and one of the things people can remember is whether the parents owned or rented their homes. And it turned out children who grew up in homes that the parents owned were much more resistant to developing a cold when exposed to the rhinovirus, but there was a critical period; it was whether they owned their home from age zero to five. It matter less later in childhood. I may be wrong, but it sounds to me like that would be helpful to community development planning to know that you might want to target young families for home ownership that the payoff may be greater for long term health.

I'm trusting that more of these examples will emerge in our discussion, I just want to point out before I end to say another advantage of thinking about these determinants of health is it allows you to look at what you can measure. Doug was saying how the communities were saying, you know, you just can't measure health. Well, it is hard to wait for people to die to look at mortality affects or even to develop frank disease, but you can see if people are engaging in healthier behaviors, you can see if they're less socially isolated. We can look at the mediators that we know affect health and get some estimate of the impact of our projects. Thank you. I'll stop with that. [applause]

[END TRANSCRIPTION.]