RECORD, Volume 23, No. 1*

Palm Desert Spring Meeting
May 21–23, 1997

Session 5PD
Underwriting Products For the Terminally Ill—Does It Make Cents?

Track: Product Development
Key words: AIDS, Mortality, Risk Classification, Social Insurance, Survivorship Life Products

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Summary: Panelists identify the various issues that would affect a company's decision to enter this market. Using insurance for human immunodeficiency virus (HIV)-positive applicants as the example, the panel discusses:

- *newer treatments and protocols for HIV-positive individuals*
- *life insurance implications in product design and pricing assumptions*
- *underwriting other highly impaired risks utilizing survivorship curves*

Mr. Richard L. Bergstrom: I'm from Milliman & Robertson in Seattle. My other two speakers are non-SOA members. Kent Major is currently executive vice president of life operations at Old Line Life in Milwaukee, Wisconsin. Kent has been involved in life underwriting for almost 25 years, and for the last 10 years he has been focusing on impaired risks, older ages, and larger amounts. Kent is a member of the Home Office Life Underwriters Association, the Institute of Home Office Underwriters, and the Impaired Risk Underwriters Association. He's also spoken to many producer and underwriter groups on the topic of impaired risk

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underwriting, and he is a member of the planning and program committee with the Second International Underwriting Congress, which will be held in London in 1999.

Our third speaker is Dr. Martin Engman. Marty is assistant vice president, medical director, and the director of medical research at Lincoln National Reinsurance Company. Dr. Engman received his bachelor degree from Gustavus Adolphus College and his doctorate in medicine from the University of Minnesota. Dr. Engman joined Lincoln National in 1990, and he's a member of the executive committee of the American Academy of Insurance Medicine, associate editor of *The Journal of Insurance Medicine*, and co-chairperson of the American Academy of Insurance Medicine's medical management and procedures committee. Dr. Engman has lectured and written a number of articles on pulmonary medicine and speech disorders.

When we started putting this session together last fall, one of the things we talked about was that with the new therapies in HIV treatments, might it be possible to underwrite HIV-positive insureds? In fact, we will use that as one of our examples later. But we also wanted to try to broaden it to say, is it not possible to perhaps underwrite other people who are considered terminally ill? First we needed to find a definition. What does terminally ill mean? We really couldn't come up with a published definition. So what we did was make up our own: "Someone who has no hope of recovery." In a sense I guess we're all terminally ill because we will all die at some point in time.

Another definition might be: "Someone who has *x* months to live." Again, if talking in terms of months, it's not likely that we're going to underwrite someone who has a life expectancy of a few months. So if you look at it more from perhaps an insurance definition, something that we're more comfortable with, you might define terminally ill as someone who is "uninsurable." What does uninsurable really mean? It could mean someone who is at a very high substandard. It could also be someone with 1,000% expected mortality, something like that. It could be uninsurable because it's "not ratable at all." It could be not ratable simply because we don't have data on which to base a rating. There just isn't anything out there to study. You might also consider someone uninsurable if the premiums we calculate are perceived to be too high or much greater then the perceived benefits to be achieved. That's not a real actuarial definition, but there are some states that do have requirements for a cost-benefit relationship to premiums.

What about someone who might be considered "chronically ill?" I use the word chronically because within the last year, it may have been with the new therapies in HIV, that we now consider acquired immune deficiency syndrome (AIDS) as more

of a chronic disease then a terminal disease. Would these folks then be considered insurable? In fact, expanding that, could we or should we attempt to insure anyone? Where do we draw the line? In other words, does it make "cents?"

These are issues that we're going to be talking about. Dr. Engman will give you some very interesting insights into the way a physician looks at mortality. Kent Major will talk more about the underwriting implications. I will discuss a numerical example specifically addressing HIV.

Dr. Martin Engman: As Rick said I'm going to begin a discussion in some detail about HIV disease, which heretofore was felt to be uninsurable. There have been some advancements in the treatment of HIV disease that has lead people to consider whether this disease is indeed insurable now and can be treated more as a chronic disease. So we're going to go through HIV disease in some detail. Following that, I'm going to show you some examples of patterns of mortality that one might find useful when one considers the possibility of extending insurance to people who again, heretofore, we've felt to be uninsurable.

Is this the end of AIDS? At least that was the question that was raised in December 2, 1997 issue of *Newsweek* Magazine. The answer that they gave was not yet, but the new drugs offer hope. We need to understand a little bit about the classification of HIV disease. There are a number of classification systems out there, but one that is in common use is that employed by the Centers for Disease Control (CDC). They talk about acute HIV syndrome, dramatic infection that is persistent and generalized, and the disease prognosis. What happens is, when the HIV virus enters the body, one gets a flu-like syndrome similar to other viral infections. The symptoms are self-limited, but the virus persists in the body and you enter a period of a symptomatic infection, which may persist for years during which time the immune system is quietly compromised. Eventually generalized lymph node enlargement occurs and finally, after the immune system has been sufficiently compromised, other diseases develop, such as neurologic disease, or secondary infections with organisms that are usually felt to be uncommon. Various types of cancers can also develop.

The basis for the staging systems rests on whether there are antibodies present in the body to the HIV virus, whether there are lymph nodes that are enlarged, or what the CD4 cell count is—CD4 cells are immune cells. Lymphocytes fight off infection and as HIV disease progresses, the lymphocytes fall eventually to a level that allows opportunistic infections to occur. Of course, it's at the late stages of HIV disease when those opportunistic infections occur.

ARC AIDS is an obsolete term. We use to talk about ARC, which is AIDS related conflicts, but really that is best considered an early stage of symptomatic disease. AIDS is the stage of HIV infection when the complications, such as opportunistic infections and other complications, occur.

HIV disease or AIDS was first recognized in 1981 when the CDC reported five cases of what's called pneumocystis pneumonia, a rare form of pneumonia occurring in immuno-compromised people, and also 26 cases of Kaposi's sarcoma, a cancer that occurred in homosexual men in Los Angeles and New York. This was in 1981, and because the disease at that time was recognized only in homosexuals it was given the name gay related immune deficiency (GRID). We know now, of course, that HIV disease affects all sorts of people and that homosexual exposures are only one of the risk factors.

I saw my first case of HIV disease in 1982 in a 52-year-old Haitian immigrant who had tuberculosis. We treated him appropriately and thought that he was recovering only to find a couple of months later that he was admitted to the hospital with seizures. A computerized tomography scan was done that showed he had a mass in his brain, which many of us thought to be a focus of tuberculosis in his brain. But other people felt that no, he had been complying with treatment and he had been on good treatment, so it would be unlikely that this was tuberculosis. A brain biopsy was done and he was found to have a rare form of cancer called reticulum cell sarcoma, which at that time was recognized only in children who were immuno deficient. It was very strange that this 52-year-old Haitian had a cancer that was seen in immuno-compromised people. We didn't know much about GRID at that time, it wasn't called AIDS. We did know that these people were immuno compromised and we did studies of his immune system and found that he had similarities to other people who had been reported to have the GRID syndrome. We didn't know what the virus was, and at that time we didn't even know it was actually caused by a virus. Many people thought it was due to a toxin and not an infectious agent.

However, in late 1982, the public health officials had pieced together information and recognized that the pattern or transmission of HIV disease was very similar to the pattern of transmission of infectious diseases, notably hepatitis B. So by the end of 1982, a lot of people felt that it was really due to a viral infection.

The virus actually was not identified until 1983 when Dr. Luc Montagnier of the Institute Curie near Paris and Dr. Robert Gallo at the National Cancer Institute actually identified the virus. We know a lot about HIV now. We know quite a bit about the structure of the gene. We've met the genome of HIV. We know that the gene for HIV consists of two strands of RNA. Humans and other mammals and

most organisms had DNA as their genome, but HIV virus has RNA, a different form of genetic material. So we know about the genome, we know that proteins that are produced by the organism, and that has allowed us to develop antibody tests for those proteins. We have the first-generation test that allows us to detect proteins produced by the virus as a marker for the presence of HIV disease, and this is one of the diagnostic criteria of being infected with the HIV virus, whether or not your AIDS test is abnormal. When the virus enters the body it binds to receptors on the cell surface, then is taken inside the cell. The genome is uncoated and that exposes those two strands of RNA that we were talking about. Then an enzyme called reverse transcriptase makes a DNA copy of that RNA, which is then integrated into the host genome. Another enzyme, called integrase, makes this possible. Once it's in the host genome, then the cell mechanism makes further copies of that strand of DNA. The DNA uses the cells' mechanisms to start turning out proteins, such as viral proteins. These viral proteins are in long strands and must be cleaved at the shorter strands for those proteins to be active. Another protein, called protenase, makes those cuts. Once the protein is cleaved, those fragments of protein, which are reassembled as viral particles, are then secreted back into the blood steam only to infect other cells.

We now have medications that can attack various points of this life cycle of the virus. The earliest medication, AZT, was introduced in 1987. This is a drug that blocks the action of reverse transcriptase, the enzyme that we talked about earlier. We also note that the HIV virus affects these lymphocytes, primarily the CD4 lymphocytes, and then reproduces. The virus is excreted into the blood and those viral particles then reinfect other lymphocytes, and this whole cell cycle takes about two to six days. But the HIV virus also affects other long-lived cells, such as cells in the general tract and cells in the brain. These are felt to be sanctuary sites, where the drugs can't penetrate as easily. HIV can live for a long time in these sanctuary sites, and so now we're thinking about ways to attack the viruses that are hiding in these sites.

When the virus enters the body, as I said, it reproduces very rapidly and we get a viremia, a lot of virus in the blood stream. This produces the flu-like illness that we talked about, which is self-limited; you feel achy, just like any other viral infection that one might experience. In response to that the immune cells in the body, the CD4 cells rise to try to fight off that infection, and the viral code drops rather precipitously and symptoms resolve. But the virus continues to reproduce and reinfect other cells on an ongoing basis over a period of years. As it does so it destroys these CD4 cells and eventually the CD4 cell count drops. When the CD4 cell count drops to low enough levels then opportunistic infections and cancers can emerge, and this is where you have AIDS developing, the symptomatic disease. At the same time, the amount of virus in the bloodstream rises.

It's very difficult and expensive to actually culture the virus from the bloodstream, so other tests have been developed as markers for the viral load. The most common test, the best test, is for the HIV RNA levels. As we said before, the genome of HIV is RNA, and there are assays, called PCR assays, that can be used to measure the amount of circulating RNA in the bloodstream, and that is a good surrogate marker of the viral load.

We talked about the virus entering the cell and the various points in the life cycle of the virus where critical steps occurred. One of those is reverse transcriptase, where that RNA is transcribed into DNA, which is later incorporated into the host genome. We now have medications that can treat that. We talked about AZT, which can affect the reverse transcriptase. In 1992, other reverse transcriptase inhibitors were introduced to treat HIV disease. Combination therapy was first recommended by the CDC in 1992 as well. In 1994 and 1995, other new drugs were introduced that also block the action of the reverse transcriptase enzyme. There are other points in the life cycle of the virus that can also be attacked.

We said that once the RNA is transcribed into DNA and is incorporated into the host genome, the host genome begins to produce proteins in long strings that need to be cleaved into shorter segments in order for the virus to be reassembled. Then the enzyme called protease does that cleavage. We now have drugs that are called protease inhibitors that attack that point in the life cycle. You may have heard about the protease inhibitors. The first was introduced in December 1995.

There's another enzyme called integrase that integrates the DNA copy into the host genome. Drugs to block integrase called integrase inhibitors have already been developed. They have not yet been introduced into clinical practice, but we're hopeful that in 1997 integrase inhibitors will also be brought onto the market. There are other drugs called Zinc finger Ring inhibitors that we also expect will be introduced in 1997.

Who knows what the future will hold? Over the years there's been an exponential increase in the number of drugs that have been found to be effective in treating HIV disease. There are also different types or classes of drugs that work in different parts of the life cycle of the HIV virus, so there is certainly reason for optimism. People are now talking about the possibility of curing HIV disease, and they're talking about ways to attack those sanctuary sites where the virus may be hiding for years. People are so optimistic that they're now even talking about whether or not HIV disease is insurable whereas, just a few years ago, that would be really quite a remarkable statement to make.

What about survival? We talk about one-year, two-year, and three-year survival rates, and survival is measured in a period of months from the time AIDS develops until death. These rates had not improved significantly between 1980 and 1990. Remember, AIDS is not the same as HIV infection. HIV infection has a long latency period, probably as long as ten years or more before the symptomatic disease and the complications of HIV infection result. When those complications begin the term AIDS is appropriate to use. So once you have the cancer, once you have the complications of HIV disease, survival can be measured in a period of months.

What about the trend in survival over the years? The trend in AIDS survival in New York City from 1980 to 1990 shows a small upward slope indicating an increase in survival. But again we're talking about a change between 10–16 months in 1980 and about 20 months in 1990. Again survival is measured in a period of months, which is not very good. Note that this is using the treatments that were available from 1980 to 1990. Before 1990 all we had was AZT as a single drug that was effective in treating HIV disease. Since then all these other drugs were introduced, so it is certainly conceivable and hopeful that AIDS survival will also improve now that we have these new medications to treat the infection. But most people are still talking about that latency period as the window of opportunity—the time from initial infection to the time that symptomatic AIDS develops. This is where a concentrated effort is being made to really treat early infection aggressively and perhaps lengthen that latency period.

What about survival? There are a couple of cities I'd like to go over in some detail with you that should give you a perspective on what we're talking about. In the early 1980s, we didn't know what the cause of AIDS was. We did know that homosexuals were a group that was affected by this disease process, so in the attempt to identify the cause of AIDS, a number of studies were done in this country centered in Washington, Chicago, Los Angeles, and Pittsburgh where homosexual men were recruited who were healthy, had no evidence of AIDS, and had no evidence of cancer. They were asked a lot of questions, blood was drawn, blood tests were done, and, importantly, blood was stored. Again we didn't know the cause of AIDS and the study was done to try to cast a broad net and find that cause of AIDS.

In the Pittsburgh study, there were over a thousand apparently healthy homosexual men who were recruited into the study. Their average age was 31; 95% were white, 40% were professional, and 80% were college graduates, so they certainly had demographic characteristics that would resemble a population that would otherwise be insurable. These people were followed over the years and we can see that survival wasn't great. For all white, 31-year-old males there is a 70% 10-year survival for the group. For this group of homosexuals, also 31 and male, we're

talking just a little over 20% 10-year survival when compared to the expected population survival for 31-year-old white men in the U.S. at that time.

The blood that was stored was then analyzed, and the results of those retrospective analyses of blood samples allowed these four groups to be identified. The group with the best survival had CD4 counts that were the highest, over 500 per microliter. They also had the lowest amount of circulating HIV RNA that we talked about before. The highest CD4 counts and lowest amount of circulating RNA resulted in the best survival. Those who are at the worst survival had the lowest CD4 counts and the highest amount of circulating RNA. So when you look at that, 70% 10-year survival is really pretty good. For the most part these were people who did not have any treatment for HIV. They were just followed prospectively.

If you do some calculations, though, on what the excess death rates are in the relative mortality ratios, we can see that compared to what's expected for the population of 31-year-old white males in the U.S., the excess deaths were about 3–4 excess deaths per 1,000 during the first 4-year interval. These increased to about 50 excess deaths per 1,000 over the 4–10-year interval, and from the entire duration of the study it increased about 30 excess deaths per 1,000. That translates into relative mortality ratios with respect to the general population of about 500% for the first 4 years. We're talking about 2,500% for the interval of 4–10, and overall we're talking about perhaps 1,700–2,000% for the entire study. That's compared to the general population's life expectancy. Compared to insured lives' expectations, of course it's much worse. We're talking about 750%, or 4,000% and about 3,500%.

Another study was the multi-set of hemophilia cohort study. This looked at younger people who were affected with hemophilia and was designed very similarly to the previous study that we talked about. Another high-risk group for developing AIDS are hemophiliacs because of the blood product transfusions that they receive in order to stop the bleeding complications of hemophilia. Again, when this study was started, we didn't know what the cause of AIDS was, but blood samples were taken and stored on regular intervals and later analyzed. There are 165 persons entered in this study who meet an age requirement of 16 years, and they were followed every 6–12 months until death or until they developed AIDS, or until their last clinic visit. Most of these individuals had severe hemophilia; 142 out of the 165 had severe hemophilia. We saw survival rates that were reminiscent of the previous study. The best survival were those who had the lowest number of copies of circulating HIV RNA, and the worst survival had the highest amount circulating HIV RNA as determined early on in the course of the study.

We have two survival rates for each group. One is for AIDS-free survival and the other one is for overall survival. The AIDS-free survival is higher than the overall survival for each of these groups. The reason is that these people also died from causes other than AIDS. They died of complications from hemophilia, for instance, hepatitis. The AIDS-free survival is about 93% at 12 years. If you again do a mortality analysis on this study, you find that the total excess death rate is about 14 excess deaths per 1,000. When you calculate the relative mortality rates then we see that it's about 800–900% compared to the general population and about 1,300–1,350% compared to the insured lives population. Remember, though, that these total excess deaths are comprised not only of deaths due to HIV disease or AIDS, but also deaths due to complications of hemophilia.

If you say that the hemophilia excess death rate is about 3 excess deaths per 1,000, that will give an excess death rate for HIV of about 11 excess deaths per 1,000. You can then calculate relative mortality ratios for HIV disease based on an excess death of 11 per 1,000, and that will give you a relative mortality ratio of about 700% compared to the general population and about 1,100% compared to insured lives population.

Why pick 3 excess deaths per 1,000 for hemophilia? That's the number of excess deaths that correspond to mild hemophilia. Hemophiliacs are commonly offered insurance today, but recall from the study that 142 or most of these individuals had severe hemophilia. So if the excess deaths due to hemophilia are actually higher, than the excess deaths due to HIV disease would be correspondingly lower and the relative mortality rates for HIV disease would also be lower, perhaps in the range of 400–600%.

What sort of survival do you need to achieve in order to wind up with a select mortality ratio in what is commonly felt to be insurable range? A select mortality ratio of about 500% would correspond to a 10-year survival of about 94% for 31-year-old white males. Remember from the study we got a 70% 10-year survival in that early study. Recall, though, that most of these people in this study were untreated. We didn't have medications. This survival was achieved just on the basis of sampling blood. Early on in the course of the study had they been treated with multi drugs that are commonly used today perhaps survival would even be somewhat better.

Compared to what was projected in 1988, where are we? When you compare the annual mortality of the male homosexuals with HIV disease and the annual mortality for hemophiliacs with HIV infection, it's now much better than we had early on, but not quite as good as 500% of standard yet.

The purpose of this presentation is not to come to any conclusions, but rather to stimulate each of you to think about highly substandard HIV risk being only one example of a disease that was previously thought to be uninsurable. What are some things that we might consider about HIV disease? First, there may be some persons with HIV disease today who have mortality expectations that fall into the insurable range.

We talked about how the HIV virus consists of RNA, which needs to be transcribed into DNA before it can be incorporated to the host genome, and the enzyme that does that is reverse transcriptase. This is a very active process and a lot of copies of DNA are turned out. This enzyme of reverse transcriptase is a very active enzyme, but it's a very sloppy enzyme and it makes a lot of mistakes in this copying process. Some of the mistakes are beneficial for the virus and results in mutations that cause the virus to be resistant to treatment with some of the drugs that have been developed. A lot of the mistakes that the enzyme makes are detrimental to the virus and turn out copies of the virus that are defective and cannot produce AIDS. We know that 10% of people who are infected with HIV disease today are infected with defective viruses who don't go on to develop AIDS, so there are undoubtedly people today who are infected with HIV who will not go on to develop AIDS.

Yet the number of such persons who would otherwise qualify for insurance may be relatively small if you consider the other impairments and other demographic factors that may go along with the persons at high risk for developing HIV disease. They may have hemophilia, they may have hepatitis, and/or they may not qualify on a financial basis. So the relative number of people who would qualify for insurance may be relatively small. If you consider that there may be one million people in the U.S. today who are infected with HIV and that 500,000 to 750,000 of those may have AIDS, we're talking 300,000–500,000 people in the U.S. today who may have HIV and not have AIDS. And of those how many have hepatitis? How many others have impairments that would make them uninsurable? How many would qualify on a financial basis? That pools shrinks, and so the total number of people that may qualify for the insurance might be relatively small. Correspondingly a large number of applicants might be attracted to a product designed specifically for HIV disease who would otherwise not qualify, therefore most applicants are likely to be declined.

We must also recognize that clinically there may be a downside to declining any applicant with the HIV disease, and we may draw some criticism for offering short-term-risk products as opposed to permanent insurance. There may also be reasons to pursue the possibility of developing products applicable to other types of highly substandard risk. I want to talk more about mortality patterns.

Mr. James D. Atkins: I have a question about the defective HIV virus. Does that block effective HIV infection in the future? Can they be reinfected with the killer virus if they've already been infected with the defective virus?

Dr. Engman: That's a very good question. The answer to that is really not known, but it is strongly suspected that it does provide protection, and the data from this comes from emerging countries where the number of people so infected is somewhat higher. They seem to have protection against developing infection and pathological screening as well.

The pattern of AIDS patients' increasing death rate is very similar to the pattern of death rate that we would see in the general population. As you get older the death rate increases. Another pattern of mortality would be one where there's a constant excess death rate over time. The third pattern, of course, should be one where there is a decreasing pattern of mortality over time. One could hypothesize and indeed that's what we've done, that every disease may fall into one of these patterns of excess death rate: either a constant excess death rate, a decreasing excess death rate over time, or an increasing excess death rate over time. I would like to give you some examples of some work that we've done.

We're all familiar with the pattern of the general population survival curve from the 1975 to 1980 U.S. life tables and the corresponding death rate that results in those survival curves over time. One can model out the pattern of death rate over time, and come up with an exponential expression for that. If you use that pattern of an exponential death rate you will see a survival curve which virtually overlays what is seen in the population.

We can look at a pattern of a constant excess death rate of 20 per 1,000. I challenge you just to think here for a second, what sort of a survival curve might you expect this pattern of constant excess death rate to result in? You have an exponential decreasing survival curve. Another pattern is one where there's an exponential decreasing (excess) death rate over time. You could also have a pattern of an exponential increasing excess death rate over time and the resulting survival curve.

One can take these patterns of excess death rates and model out survival curves that approximate the various disease processes. In a study from 1992, the survival rates of 48-year-old men and women who had malignant melanoma were compared to the general population survival curve for 48-year-old men and women. The survival curve was level at 0.76 for those with malignant melanoma. This is a very thin malignant melanoma, the type that has the best prognosis. One can model an

excess death rate, a constant excess death rate of 16 excess deaths per 1,000 and get a survival curve that virtually overlays what occurs experimentally.

When you look at a thicker melanoma, one having a thickness level of 1.5 millimeters, one can model out a survival curve based upon a constant excess death rate of 35. The result is a survival curve that virtually overlays what the research found.

A thicker melanoma, a level of 4.0, can be modeled by an excess death rate of 60 excess deaths per 1,000. And the worst type of melanoma, one with a level thicker than 4 millimeters has an excess death rate of 200 excess deaths per 1,000 and decreasing to 0 over 15 years. One can model out all of those survival curves very nicely.

Another example would be the survival curve of 57-year-old males who have coronary artery disease and who don't have congestive heart failure. This survival curve can be modeled by an excess death rate for a constant rate of 18 deaths per 1,000 per year. This virtually overlays the one that's found clinically.

We can model the survival curve for bad coronary disease, which involves 3-vessel coronary disease with congestive heart failure, with a constant excess death rate curve of 100 excess deaths per 1,000. You get a pretty good approximation. You can refine that somewhat by having an excess death rate that goes from 150 excess deaths per 1,000 to 80 excess deaths per 1,000 over the first year, and it stays constant at that level. You would see that the model virtually overlays the one that's found clinically.

Finally, I'll discuss an example of HIV disease. One can model the HIV survival curve for the excess death rate cases. It results in a model survival curve virtually overlaying ones which were done clinically. I haven't done it in a lot of these processes, but for the ones I have done they all fit into a pattern of a constant excess death rate, an increasing excess death rate, or a decreasing excess death rate over time adjusted for the level of excess death.

So I will leave you with this thought. Rather then developing impairment-specific products, there may be a reason to pursue the possibility of developing products applicable to various types of highly substandard risks, including HIV disease, cancer, other diseases, and genetic impairment. The products might be based in part on the patterns and levels of mortality. Therefore, one wouldn't necessarily create an HIV-specific product applicable only to people with HIV disease, rather one would develop a product with an exponential increasing death rate curve over

time that might be applicable to, for instance, Huntington's disease as well as HIV disease.

Mr. Bergstrom: It's fascinating, isn't it? Such an interesting way to look at mortality. I think we too often are set in our own way of doing it, so when we have a physician or someone else give us an alternative way to view it, there are obviously many different ways to fit some of those curves. But I think the concept of looking at it this way could be something that we can certainly do in the future, to look at how physicians calculate life expectancy for impaired risks.

Kent Major will give us his impression of some of the underwriting considerations and implications for terminally ill people.

Mr. Kent Major: I want to discuss how we might go about underwriting some of these risks that we're talking about here. The term I gave it, from an underwriting perspective is, selecting the best of the worst. One of the things that underwriters used to like about these cases is that when these came in they were an inch thick. They were HIV-positive or some other difficult cases. They could turn to the first page, see the diagnosis, stamp decline and throw it out the door. Now they may want to take the time to read all these 100 pages and select the best out of the worst. I really think there are opportunities here.

We've all heard the statement that with change comes opportunity. I think this is a perfect example of an opportunity that is there for the underwriting community and for insurance companies. We've seen it over the years with many types of disorders. Remember years ago we used to have things like bypasses? Where the opportunity wasn't too great because the rating of some of these things, remember when they first came out, if you had a triple bypass the rating was a Table H plus $50 per 1,000. The chances of placing that were about one in a million, so you never placed any of these. Now you see best-case scenario on some of these single-vessel bypass diseases, you're getting close to a standard type of risk. Now it's one of the biggest opportunities we have because, as you know, we've seen many thousands of coronary cases where bypasses have been done and now we're able to insure these individuals at what I consider a very reasonable rate.

There are things that an underwriter has to consider, go through, and think about. When you are dealing with this high-risk marketplace, and these are high-risk types of individuals, one of the first things that I think is key that I'm glad to see is happening in more companies is the teamwork used in product design. I can guarantee that when I first started out in underwriting 25 years ago, I don't recall any discussion between an underwriter and an actuary about product design, how we were going to underwrite a case, and what all the implications were. I'm glad to

see that more companies are gathering a group of individuals who are going to be involved with this product. The actuary, the underwriter, the medical directors, these types of people together formulated or put together some of these policies that we're now going to be looking at. You certainly know the basic understanding, the models, and the expectations of the product.

One of the things I don't see too much of is feedback on what's going on, and in this type of marketplace I think it's critical that you get feedback very early. We like to see long periods of experience before we make adjustments, and the trend over the years has been to see whether or not these pools of individuals that we think we're creating are going to give us the mortality that we're expecting. I think we need to look at and really understand the benefits and the commissions of the products. I think this may be an area where levelized types of commissions may come into play. You may not want to have the front-loaded commissions, but instead a ten-year levelized commission or something of that type. I just thought I'd throw that out there because it's something that came into play when I was at my prior job, where I wrote a lot of very high-risk individuals. In fact, the motto there was "bring us your old, your sick, and your rich and we'll issue an insurance policy to them."

One of the things that came up was a very interesting case where we used to have a short-term product designed primarily for short-term needs. I had a case where a gentlemen had just been diagnosed with a fairly high-risk type of prostate cancer. It was called a Stage C prostate cancer, which has some very high early mortality and the producer said, this gentlemen is CEO of a large company. He has a three-year need because of some liability obligations. Would you be willing to issue this contract under those circumstances? When I started thinking about it, looking at the survival curves for this type of cancer, I thought, the chances of him living three years are probably pretty high. Maybe there's an opportunity there. Again, I don't know if there is, but maybe there is. In this particular case I did make the decision to go ahead and issue the contract. It stayed on the book three years, disappeared, we did re-underwrite the gentlemen at that time based upon this three years of further survival with this cancer condition. We were able to come up with a rating for him after that period of time on a re-underwritten basis.

The other thing, of course, is that we're all looking at very high-risk individuals, but many companies are out there are looking at individual risk and survival type of products. We had survival types of products that basically went from the typically 500% mortality, which a lot of companies will decline, all the way up to about 5,000% mortality, which equates to a two to three-year life expectancy. We were constantly dealing with these high-risk individuals.

Now the impairment itself has to be looked at very closely. Of course, Dr. Engman did a great job evaluating one of those, which is HIV. This is really critical; I think there's a new breed of medical directors out there who are working with underwriters to come up with these types of assessments of these high-risk impairments. I think that's a very critical part. I was fortunate to have a medical director with whom I could get together with and as a group, come up with our evaluation of these impairments and say, this is what we want to do with them.

To take on these insureds certainly we'll have to stay up to date on the latest information and, as we all know, with the Internet there's easy access to a ton of information out there about any impairment disorder, whatever it is you want to get into, take a look at, and be willing to react to the latest information. Again, for underwriters this is something new. Just as we all know, this idea of the cocktails that seem to be so successful with many of the HIV-positive patients is doing so well, but you can't wait for 5–10 years and say, what are we going to do with that? We have the information, we have these clients, we need to react to this information now and not wait for a long period of time before we react.

Of course, identifying the positive and negative factors is the key to so many cases that you underwrite on an impaired-risk basis. This comes into play whether you're talking about prostate cancer, breast cancer, or coronary disease. I remember back when I first started underwriting those with coronary disease, the whole distinction then was single vessel versus multiple vessel. Now we're talking about injection fractions and diastolic pressures and all sorts of different things. Such additional information is a real key element in how you underwrite these cases.

Again, I'll stress mortality curves. Dr. Engman did a great job of demonstrating the different mortality curves we're talking about. How is the progress of the disease measured or how do we say, where are they along this curve? What are the factors that we're looking at that help us place it along that curve?

Education for the underwriters has always been critical. I've always tried to say you have to keep your underwriting staff up to date. Now it becomes critical that you do it in a very timely manner. To tie underwriting in with information as it comes out you must to have sessions with your underwriter, to keep them up to date so that they understand all of these factors.

Educate the field force. These next couple of things I think are key and something that a lot of companies don't do and we did on a monthly basis. We took a disease or disorder and sent out the best information we could, brought down to the lay level, so that they understood from a medical standpoint what it is that we were looking for. We even provided them with questionnaires that said, if you see a

client with this disorder, whether it was hepatitis C or some sort of coronary disease or renal failure or any of these high-risk individuals, what are the questions that you need to ask these individuals? What kind of information is it you're looking for to categorize what we're talking about here? That gets very critical and you must make sure that your field force understands as well as the underwriters.

Then there is an opportunity where we may have to go out and educate the reinsurers. In the past, I've always thought that underwriters looked at the reinsurers as those who had maybe the little more advanced knowledge because they had more experience, because they saw so many more of these cases, because all these cases that we're seeing are fed to them from a variety of companies. Now there may be an opportunity to reverse that and say, you know, we've done our research, we've done our background check, here's the information we've come up with, and here is what we want to do when we see impairments or disorders of a particular type. It may be a reverse education here.

Underwriting requirements are very interesting when you get into this arena. You know, we have the typical pyramid—blood, urine, EKG, and so forth. I'm not sure that applies to these high-risk types of individuals. Certainly you know the application and form design is something that the underwriters need to be a part of. What I'm saying is, this is probably the type of market where you don't want a full application. You probably want some form of an inquiry application that can give the key factors that we're looking at, or something that a lot of companies are designing called quick quotes. What kind of questionnaire or what are the key pieces of information that I'm looking for?

You certainly should focus, as I said, on the age and amount requirements. Do the current age and amount requirements make a lot of sense? We see individuals who are high risk, whether it's an HIV patient, a cardiovascular patient, or a patient with cardiomyopathy, and they spend a lot of time at the doctors office. They have routine checkups and care. There's probably more information in that attending physicians' report than will ever come out in a pyramid or a blood or a urine test that you may get on a term basis. So some of the more standard, traditional types of things may not be required in these kinds of patients. Again, that may cut down on your cost because there is going to be cost for some of the other, newer tests that you may want to eventually get.

Getting the proposed insured involved in his/her care is a real key. We've always known how critical this is, again this goes back to the traditional thing. With coronary artery disease, the type of patient you're looking for is the one that drops his or her weight down, lowers his cholesterol, stops smoking, and takes up an exercise program. This is the type of coronary patient you want, not the type that

says, "I had triple bypass and I feel great now. I don't have to go back to the doctor anymore. He's healed me; I'm cured." That doesn't work; I can guarantee it. With a diabetic, the care or the involvement of the diabetic in his or her treatment and care are critical. That control factor is a very critical factor with these types of patients, whether it's HIV or whatever the case may be. I think it's critical that they're involved with their care process, taking their medication on time, and getting back for follow up with the doctor.

The health care facility and work up is a real key. Make sure that they're getting the best of care. Of course, there's an issue here of cost and what type of health care they have. There's a lot of other issues we're all aware of that surround these kinds of individuals, but they need the best of health care, the best follow up, and the work up can be a real key.

Then comes the underwriting decision, and this is the tough part. The underwriter has to step forward and say, "I know what I'm doing and here's how I'm going to do it." Life expectancy becomes a key factor. I'm an underwriter from way back, and back then you would say, I have this hypertensive patient, or a I have a diabetic patient, or I have a patient with ulcerated colitis. You would look in your manual, the guy was 35 years old and now he's at just plus 100, through a Table C or D or whatever the rating was for plus 100 debit. That was it. You never realized that that 35-year-old man with a Table D, you may still be looking at a 30–35-year mortality at best on this individual. Now I think you have to reverse that and plot these individuals on these curves and say, we anticipate a life expectancy of whatever it is, even ten years. Well, a 10-year assessment and a 35-year-old person may be a Table R, F, or T or whatever well beyond that P that we're traditionally used to. I think you back into your rating and not use some sort of a debit/credit system at these types of individuals, because you're looking at life expectancy.

Home morbidity factors are really interesting to talk about because I'm not sure how they always come into play. I've always had an underwriter or a mentor who I dealt with in the underwriting department and I always said, you're only going to die of one thing, so if I have somebody who has cancer and another who has some sort of coronary problem, these are totally unrelated types of diseases. You only die from one or the other. But if someone has both, what kind of rate should go on it? If one is a plus 100 and the other is a plus 100, is it 200? You know the debits—is that the rating you put on it? Is it 125, or 150, or maybe the plus 100 covers both of them. I think you're going to run into this when you have these types of individuals who have a high-risk type of impairment. You're going to come across other impairments they have and you're going to have to assess, does this add to it? You'll have to incorporate that into the assessment that you're putting on them. So it's going to be a real interesting process for the underwriters.

Flat extra certainly may come into play, you know, where you get some money up front. Stability periods are going to be a real interesting part on these individuals. It's a matter of at what point after they're discovered to have—let's say HIV, they're treated, they've been on these cocktails, and they've been very successful with them. How far along in this process of taking these drugs, where they appear to be doing their job, do you now say, I'm ready to insure this person? Do you wait for a year? Do you wait for two years? Can you do it after one month? We've always looked at that with other types of disorders or disease, such as hypertension. Somebody comes in with very high blood pressure and he goes on medication. You want to see a period of time where there's three months, six months, or a year of stability to make sure that this medication is going to do what it's supposed to do, it's going to hold over a long period of time, and that they don't break out and go right back to this hypertensive state again. Trying to determine what that stability period should be is going to be very critical.

Certainly you need up-to-date information. We've talked about that. Again, if you think about this as a whole, new mind set for the underwriters. There's going to have to be somebody to make sure that they understand and are comfortable with how they're going to be handling these kinds of patients. Also, I think risk taking is going to be a real heightened type of position for the underwriters. As I said, these are the types of cases in the past where the underwriters used to say, this is an easy one. Decline it, throw it back, and I'm done with it. That was one to get off your desk in a hurry. Now I'm saying, you have to take your time and say, does this person have five years, ten years, eight years? How are you going to assess the life expectancy of this individual? It's a whole different way of thinking than right now.

Regarding reinsurance—I think we're going to be at a point where initially we're going to want to spread these risks out. No one is going to want to take these high risks on a lump-sum basis. They will take them all, but they want to spread it out and make sure that we are doing some of the right things.

Let's discuss post issue. I think we need to monitor the claims very carefully. This is one area I've always thought, from an underwriting perspective, it would be great to have on every insured that I take in. I'd love to see some numbers if I assess somebody that's say, a 35-year-old man at Table D, which gives him a thirty-year life expectancy. On an individual basis, I'd love to have a way of tracking that so I could just see it at some period of time and say OK, I want to see all these people that I expect to live ten years. Where are they now? That's something I don't know if we'll ever get to. But on these types of individuals, I think it's almost critical that we monitor them, see where they are with regard to our underwriting expectations, our actuarial expectations, and say, we need to make some adjustments now. We're not going to wait for two years, five years, or ten years.

The question is, are we ever going to reconsider these individuals? You get somebody and you say, I think he's right here right now. We're going to put this price on him. Now we are two, three years down the line and now something new comes up. Now they come back to you and say, I'm in better shape now than I was two or three years ago because of this new factor. Are we going to reprice, relook at it, reunderwrite these individuals for possibly a better rate? Expenses go up with this type of thing.

Unit cost is a real issue here. I know I monitored these individuals very carefully because I think what you end up doing in a population like this, you don't want to have people sending in full applications, going out and getting exams, blood, urine, all of those types of costly things, getting all that done and still declining perhaps many of them. I don't know what it might be. It becomes too costly from an underwriting standpoint. I think what you're going to see is a lot of inquiry trial applications, or whatever you want to call it, which are not too expensive. It's a form that they have to get, the attending physician's statement, and send it in, but it's very costly. You're talking about having some of your more senior underwriters with higher salaries work on these. I looked at about 20,000 inquiries a year at my former company, and I know that in a good year we had a placement rate of 6–7%, so it's a very costly type of assessment. I still think it's an opportunity; it's something we need to look at very carefully.

Mr. Bergstrom: Some of the other important considerations, perhaps from more of an actuarial perspective, one of the first things to consider when you're looking at a highly impaired risk, is mortality actually predictable? Within what range is it predictable? I was thinking of expectation of life now in terms of *x* years and so forth, not what the mortality curve that goes along with it looks like. If the individual is currently on a certain therapy, what is the attending physician's prognosis of the individual? This is very important, as opposed to just doing a laboratory test to find out what the profile might look at now. What has it looked like in the past 6 months, 12 months, 18 months, and so forth? What are the other risk factors? When you think of insuring someone who might be HIV-positive, and with the new protease inhibitor therapies, let's assume that these people might be able to live 20 years on average. If they don't die of AIDS for 20 years, there are many other things that they can die of before then, so we can't overlook considering the other risk factors that we would normally look at for standard applicants.

Then also, what does the expected mortality pattern look like? I won't spend much time on this because Dr. Engman did a good job on that. But generally, there are three shapes or slopes of excess mortality. There's the decreasing slope, and heart bypass surgery might be an example of something like that. Immediately after surgery there's a fairly high excess mortality, but over time mortality improves, and

so an underwriting action might be to decline immediately, or postpone for some 6 months, 12 months, or whatever.

The more level excess mortality pattern might relate to high-risk occupations. We're all aware of that. Early mortality, or mortality immediately after an infection by hepatitis C, might be an indication of something that's level for a period of time. An underwriting action might simply be a flat extra premium for a while. Then, of course, there's the increasing mortality pattern which, up to now at least, has been what we've always assumed for HIV-infected individuals.

So what do we do about underwriting HIV-positive individuals? Well, from a practical standpoint, one of the first things we need to look at is, what would the product look like? What would the benefit design be? What would some of the policy features be? What would the underwriting criteria be, and how would we test for certain aspects? What pricing assumptions should we use—not just mortality, but costs and other things? One of my favorites is reserves and reinsurance. What do we do there? We'll talk more about that later on.

Let's discuss product design. Should we allow term products? Should we allow only whole life products, or something in between? Is it actually possible, in fact, to design an *n*-year term product that can be renewable or re-underwritable at a later point in time? Could we build something like that? Ideally it might be a whole life product because we'll run into fewer public relations problems with something like that as opposed to insuring somebody for only a short, specified term and then having them die after that and not having coverage. How long should the premium-paying period be? Five years? Ten years? There's no one right answer to this. I'm just raising these types of questions because this is what you'll have to think about as you go through the process yourself.

What amount limits should we offer? Only small amounts? Could we write up to one half-million dollars? On some of the benefits and policy features—could we have a graded death benefit? Graded death benefits aren't what we're used to thinking of. Companies that write pre-need and burial-type life insurance policies have graded death benefits because of limited underwriting in the early years. Should we have a graded death pattern that decreases like mortgage term plans? Should we allow accelerated death benefits? I think most companies now allow them on standard underwritten policies. Should we allow that feature on policies purchased by people who are terminally ill? How about waiver of premium? Clearly the agent would love to sell something like that, and the insured might like to get something like that. But do we know enough to feel comfortable with the disability side of the equation, in addition to the life insurance side?

We've spent a little time talking about protease inhibitors. Essentially they block an enzyme that is crucial to HIV reproduction. It's another way of attacking the virus. And Dr. Engman did talk about a few of the other names there. As we pursue these multiple therapies and reach the conclusion that the mortality is perhaps even to the level of being insurable, we still have to find out where on the infection curve someone is. There are a couple of ways to do that. One is the traditional way of looking at the CD4 count. If CD4 is reasonable, we assume that they're in their earlier part of the infection curve. You can also look at the viral load. There is a test to do that, but there's also a cost to that, and the cost is not cheap. Both of these tests together, which should be a minimum to test for, should cost between $250–325. Do you want to spend this much for maybe a small face amount of insurance? You still need to add on the other costs of underwriting and policy issue.

With the combination therapies, and there are a number of them out there, oftentimes the physicians will have to tweak the therapies for the various individuals. Note that they are very expensive, though. The current combination therapies cost anywhere between $12,000–20,000 a year. Because of this, they may only be purchased by people who can afford them or who have medical coverage to pay for them. Even at that, however, it requires a constant monitoring for virus resistance. Will it mutate? Is it working? So this is something we would need to have a history of, where these people are in their prognosis and treatment. Oftentimes you have to change the "recipe." So even though you may currently have AB&C, maybe down the road it'll need to be one-half A, 2B, and one C.

Note that even if the patient can afford these therapies and apparently is willing to take them, will he or she stay with it? The point here is, these therapies require a lot of discipline to take 20–50+ pills a day and drink eight gallons of water. Let's assume they start feeling better. Would they say, "I feel great, I'm going to back off," and what do we do about that now that we've got them insured?

One of the biggest concerns that I have with this whole thing is that we essentially have two groups or cohorts of people. We have the group that should experience relatively good mortality over here because they are staying on their treatment. However, those who either don't take the treatment or get off the treatment are going to have a mortality that looks much worse. Where do we price this stuff? Do we price it in the middle? I think not. Somehow we have to make a stand and decide what we're going to do. This is too broad of a mortality spectrum to price it in the middle.

We can look at the actual underwriting criteria of one of the companies in South Africa that writes life insurance on HIV-positive individuals. Their requirements are

(1) a low viral load, and they consider low fewer than 2,000 RNA copies; (2) a "good" CD4 count of greater than 500; normal for most of us would be something in the 800 range. They need to know (3) what the progression of the change has been. They're not going to write someone on a one-time basis; they want to know what the history of the disease has been up to that point in time. Also (4) are they on treatment and what are those treatments? (5) They also need to be classified as World Health Organization stage one or two, which means the disease is very early in the infection curve, and (6) finally, they need to be otherwise asymptomatic of AIDS.

A particular mortality was determined for excess mortality for a group of presumed HIV-positive individuals in San Francisco in the late 1980s. At the end of ten years of infection, roughly half of the people died. At the end of 20 years, 88% of the people died. I developed a model just to see what the premiums might be on a policy with that level of mortality and found them to be very high. I decided to reduce the excess mortality so much because of the new therapies, although my approach wasn't very scientific. The excess started out as half a death at a thousand and then increased half a death a thousand per year just to see what would happen. When I did that, at duration 10 the cumulative excess mortality was about 20% on that basis. By duration 20, it was 60%, a little better than the old basis, but still not something real good.

So if you want to think through potential pricing assumptions, you obviously need to come up with a mortality assumption or two, and I would suggest that you use a number of different patterns to see what results look like. How about persistency? Would persistency be good or not? I think it would be good. Unless people started feeling really good themselves and got off the therapies, or if they thought they could find something better priced and thought they could get away with something, then persistency might be bad. But I think someone who has insurance would likely keep it in this case. I think expenses will be relatively high, particularly the underwriting costs. At $350 or so for just those two tests, what are the other costs? Something else, you're not going to place everyone that you approve. If your placement ratio was 50% you'd have to effectively double your cost due to those who you do not place.

Commissions? Without getting into details, I'll just say don't overpay, because my guess is, the agents will not have to talk these people into applying for policies like this—it may be the other way around. An agent may be getting phone calls for a change. In my example I used 25% in the first year, not a high commission.

We use a $10,000 face amount as an example. This is what happens if you can assume you know where the person is in the infection curve. For the newly

infected we want time zero. For a $10,000 face amount you need $60 per $1,000 a year for a 20-pay plan to cover that. Well into the infection curve the premium doubles. Now if you look at $50,000, the numbers are lower. Why? Because we have a larger amount to cover the unit costs up front. But still we're talking roughly $50–80 per $1,000. Is that high? Well, compared to our preferred risk plans it's certainly very high. But those numbers are not any higher than offering a plan like this to someone who is 65 years old, and we do that these days. We do offer coverage to older-aged people.

The difference is, a 65-year-old might have a mortality curve that looks one way and a 25-year-old who is HIV-positive might have a mortality curve that looks another way, and both of those curves give us the same relative premiums. I have a lot more confidence in the old-age curve because I know what this pattern is going to look like than I do for HIV. If I'm off a couple of deaths a thousand here that doesn't hurt so bad. But we don't know enough yet about the long-term effect of the therapies, what is this thing actually going to look like? We simply don't know.

What about reserves? Well, my first guess was we wouldn't be able to use the 1980 CSO realistically to develop reserves for these plans. So my example, I assumed the pricing mortality plus 20% for reserving purposes just to give me a number to work with. Tax reserves—I think we need some relief here. Right now I don't think the federal government is going to let us use a 120% of pricing mortality as a legitimate tax reserve for deduction purposes, so I think we need some help there. If you're using GAAP, you'd want to use something like pricing mortality plus margin, and please talk to your auditors, because they're going to have a lot of questions.

As far as reinsurance, until we know what we're doing, if we're going to do this at all, we have to have some way to spread the risk until the experience develops. If you're on the reinsurance side of things, even you might want to have a reinsurance pool. Collectively, we might be able to do something like this. But we have to figure out a way that nobody gets hurt real bad in the long run.

Other issues. You talk to your CEO about the idea of insuring people who are HIV-positive and he or she says, are you out of your mind? What are my stockholders going to say? This is something you need to realistically think about. If you're a mutual company, what are the policyholders going to say? They might say that you are jeopardizing the solvency of this company. You have got to be willing and capable of addressing that issue.

We've already talked about the social aspect. I think the gay community and Ralph Nader would probably love for us to develop something like this. But I think we

have to take responsibility to do it well, to think things through and offer something that's there for everyone.

As far as political implications, again I think it would be a positive, but I think we need some help, i.e., the IRS. I think we need to monitor the claims experience—what else are these people diagnosed with? They certainly will die of AIDS. But in the 20 years until they do, what else could they die of? What else should we be looking at from an underwriting perspective? As actuaries, are there any Standards of Practice we would need to concern ourselves with? That's something I think we need to think through also. Realistically should we do this? I think we need to rise to the occasion, rise to this challenge, and look very seriously at doing this. We currently issue 92–95% of the applicant pool as standard and 2–4% of the applicants as substandard. If we could issue one percent more like this, the terminally ill, I think that would be a tremendous increase in our credibility.

Mr. Atkins: If we start providing life insurance to people with these severe impairments, price as we've discussed it is going to be very high. Are there any regulatory issues involved? Are we going to be told we cannot charge enough to cover the risk?

Mr. Major: Well, there are certainly certain states like Washington that restrict premiums for small-amount coverages. They're trying to attack more of the pre-need companies. I've run into two other states where I've been questioned about the cost-benefit relationship and have had to issue a formal response to them. I'm not sure that's answering your question. But my sense is that, yes, there will be some regulatory communication that we'll need to deal with in trying to do this. I think the goodwill is there, so if we can do it in such a way that we communicate, so that they understand, I think that's a good start.

Dr. Engman: I'm not aware of states or governmental types of regulations. I don't know if this was just at my company or whether it's for others. We had some guidelines that we followed above which we thought it really wasn't appropriate to issue insurance. So we had a per-thousand charge that we wouldn't issue insurance outside of that range.

Mr. Gordon A. Gibbins: Mr. Major implies that there are underwriters in one shop or another who are looking at life expectancies, and somehow the price wasn't sure or even what product it was being applied to. It's been illustrated here that you can get the same life expectancy with different patterns of mortality. So it's not quite clear to me how they're doing it. Is there such a thing, in any company as, I'll call it

an over-Table P underwriting guide, anywhere that has life expectancies for say 10 major impairments that is being used?

Mr. Major: What we did is work with our actuaries to come up with a model, I guess that would be the right term, that said, this wasn't with our whole life product but also with our survivorship product. We came up with the numbers associated with a certain percentage of mortality and a life expectancy. So we had a chart that said, a 60-year-old at 3,000% had an 8-year life expectancy. A 70-year-old at 1,500% had a 6-year life expectancy. So we had that type of a chart that we applied. It was up to our medical director and me to sit down and, as best we could, assess where we thought this individual was with regard to the impairment or disorder that he or she had. We would plug it in, like I said, on kind of a reverse basis as to what type of assessment we had put out on it. That was the way that we did it.

From the Floor: There's nothing standard issued or published that you're aware of though?

Mr. Major: No. All we had was the charts and the actuaries that we used. We used the latest information we could find, some of the medical libraries, and whatever we could tie into, and it was on a case-by-case type of basis. So it really wasn't modeled out under any types of diseases or disorders, but more just on life expectancy given the age of the individual and how it was priced in that particular product.

From the Floor: There are a number of published clinical studies on the various diseases though.

Mr. Major: Yes, that's exactly what I'm saying. We had one, I remember, it was called Zoe Ellison Syndrome, and many companies I looked at declined it. We started looking at the literature. I actually had that opportunity to talk to a doctor who had recently completed a 15-year study on this disease, and we were able to come up with an assessment that was in the moderate substandard range that we felt very comfortable with. But again, it was just on an individual basis. The only thing I've seen close that might come to a high-risk type of, if you want to say, manual, is there a reinsurer out there who does have a older age manual? I know others are developing it. But I haven't seen anything for impairments.

Dr. Engman: I haven't seen a lot of data out there. I think that for the elderly and for those who have high mortality expectations too often we use life expectancy as opposed to mortality ratios and then work back into the excess deaths. We're talking ratios with these cases, which should be fairly common. We have done

some modeling work, and I think that one can look at life expectancy. Be sure to ask, what's the pattern of mortality over time? That's a very important consideration.