UPDATE ON UNDERWRITING

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Panelists:	THOMAS W. REESE
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- New testing techniques
- AIDS update
- Preferred risk selection
- Current topics of interest

MR. TIMOTHY F. TWISS: I'm with Lincoln National Life's reinsurance division where I've directed individual life product program design and pricing for six years. Prior to that I was doing direct-side pricing with Northwestern National Life in Minneapolis and their New York subsidiary, North Atlantic Life on Long Island.

My credentials for speaking are not as clear as the other two panelists. You have to be somewhat of a generalist working with reinsurance for a large number of products with a large number of companies. On the other hand, I strengthen those credentials on almost a daily basis. I talk to underwriters and I talk to lots of other product actuaries who talk to underwriters. From a communications standpoint, I'm happy to report that our industry is healthy enough to be rated preferred. I find underwriters very knowledgeable with strong and clear opinions on a wide variety of insurance topics. They deserve to have their own "Ask an Underwriter" button in my opinion.

Following my comments on preferred risk programs and a few miscellaneous under-writing topics, I'll introduce Tom Reese, who is a consulting actuary with Tillinghast in the Atlanta office. Tom also is chairperson of the Society of Actuaries Committee on HIV Research. He'll be discussing current conditions and developments with respect to AIDS and HIV infection. Dr. Robert Stout, our guest speaker, is president of the Clinical Reference Laboratory of Lenexa, Kansas. Bob will discuss recent develop-ments in laboratory testing techniques. The recorder for this panel is Ken Sipe, who, like myself, is a reinsurance pricing actuary with Lincoln.

Welcome to the ABCs of preferred risk programs. I was going to present preferred risk programs from A to Z, but the more I collected materials and my thoughts on the topic, the more convinced I became that these programs are really not very far along in their evolutionary scale. I make this comment even though the preferred class concept is at least several decades old. The earliest plan I've heard of was a Metro-politan Life plan from the beginning of this century. This program referred to occupa-tional and socioeconomic classes in assigning a limited number of ratings. Other early programs assigned preferred status simply to larger policy sizes. The intervening years have seen many developments in the field leading up to the present interest level which is obviously highly based on almost weekly announcements of new programs in the trade press.

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One thing is certain: this activity is not leading to convergence on the single, ultimately perfect plan format. On the contrary, while many external constraints and internal checks and balances force some similarity into these programs, there's still plenty of room for innovative design.

Several characteristics are needed to describe a preferred risk program. Each is largely dependent upon at least one other characteristic: screening items chosen for ease of obtainment and predictive value; desired qualifying percentages chosen for marketing reasons; mortality differential between preferred and aggregate -- I'll try to avoid the term "discount" because, in the well-designed plan, nothing is being offered at less than full price; and desired premium differential chosen for marketing and profit reasons.

The first of these, screening items, may be a brief footnote to the usual underwriting process, or may amount to an extensive process in its own right. The simplest preferred risk program might only screen on family history, confirming one or no cardiovascular death prior to 60, 65 or 70, or on build wherein a five-foot six-inch male actuary can't weigh more than 169, 189 or 199 pounds. The applicant cannot be otherwise rateable, and in addition, it's usually required that he or she is a non-smoker or a nontobacco user for the last 12 months. Actually that's not the simplest program. More than one company has defined preferred to be simply nonrated, nonsmokers to the delight of agents and the confusion of competitors.

A comprehensive preferred risk program goes beyond looking at the applicant's build and/or cigarette smoking habits in trying to identify a group of preferred risks that will produce better than average mortality. It is often based on an evaluation of risk factors such as blood pressure, pulse, timed vital capacity, total serum cholesterol and/or HDL cholesterol and family history. The thrust of the broader screens is to more fully evaluate the cardiovascular risk especially. The timed vital capacity test is interesting. It suffers from some lack of uniform quality administration, but it's potentially very valuable. The Framingham study found that in women it is unequivo-cally the most powerful predictor of cardiovascular mortality. In men, it is second only to blood pressure.

The brief screen has the advantages of being nonmedical, inexpensive to complete, and producing results that can be guessed by the insured and agent with reasonable accuracy. This reduces the likelihood of undue pressure on the underwriter to bend his or her decisions. A possible disadvantage is that the related premium differential may not be large. Also, the heavy reliance on family history may seem troublesome since it is largely unverifiable, and the 1983 mortality study often used as a justifica-tion of this protective test is thought to have some underreporting of family mortality by standard insureds, thereby overstating the test's protection.

The comprehensive screen is founded largely in medical evidence. The results can't be estimated with certainty. The screen can be expensive unless most tests were being performed anyway. However, most of the information is verifiable and may reduce the cost of misidentified risks. In addition, since this plan tends to be more restrictive, there is often pressure on the underwriter to make exceptions on just one test or rationalize good results in one area outweighing failure to qualify in another.

One additional item has a tremendous impact on the mortality under age 40 for both brief and comprehensive screen programs. The mortality will differ significantly for those programs that disallow participation in hazardous sports or those programs that use Department of Motor Vehicles (DMV) reports to identify applicants who have had a driver's license suspended in the last three years. By hazardous sports we mean anyone with a private pilot's license or who engages in ballooning, parachuting, hanggliding, vehicle racing, or scuba diving. By lowering the accidental death component, the mortality at the ages under 40 could improve between 5% and 15%, depending on the other risk factors used. Since screening for the accidental risk is relatively more important at younger ages, it is a good complement to screens that are more productive at middle and older ages, like family history. Note that this complementary effect often tends to encourage a longer list of screens in many programs.

Ideally, each individual in your preferred class should be more likely to have lower mortality than every individual in your residual class. Clearly there will be trade-offs between achieving this ideal and simplicity. You may come closer to achieving the ideal by requiring several qualification criteria and related cut-points. These should be set only after close communication with your medical director, your marketing officer, and your product actuary to discuss the program's marketability and practicality. Of course other program objectives such as increased sales and profits must be considered as well.

In Chart 1, let the bell curve represent standard nonsmoker mortality with expected mortality along the X-axis and number of individuals up the Y-axis, and the 100 mark on the X-axis representing average mortality. As a bad example of a preferred plan, assign last names starting with letters A through K to the preferred class. As shown in Chart 2, this produces an approximate 50/50 split, but both the preferred and residual are still distributed symmetrically around the 100 mark and will exhibit equal mortality. As a less extreme example, let blood pressure alone define the preferred class (Chart 3). Many lives with qualifying blood pressure will have other characteristics that produce poorer mortality expectations than some disqualified lives. Thus, while the preferreds will have lower mortality as a group, there will be overlapping segments. Finally, with refinement, the ideal split may chart something like a strictly vertical delineation (Chart 4). That was actually the first "finally" on this characteristic. The second "finally" is a caution to companies whose producers have multiple outlets. You may want to establish some of the tighter screens in the marketplace to avoid attracting more than your share of policies with risk factors that aren't covered in your own program.

The second key feature of these programs is the percentage that may qualify for the preferred class. We've seen the alpha-defined preferred class that produced a 50/50 split but offered no mortality differential. Perhaps we should focus first on the mortality difference and see what percentage of the aggregate may be involved. Based on Lincoln's direct writing experience, on information from Lipid Research Clinic's trial, and on the Framingham study, a 10% mortality improvement results from a clean identification of 50-65% of the aggregate group as preferreds (Chart 5).
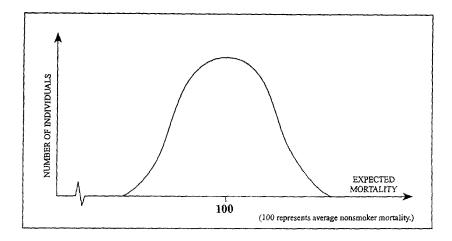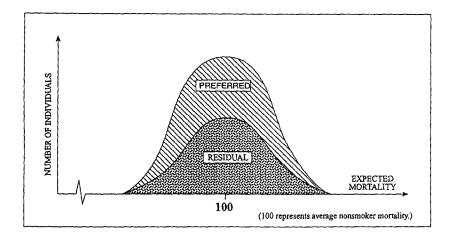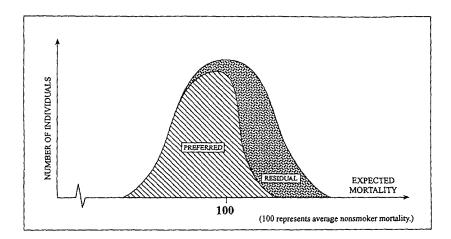
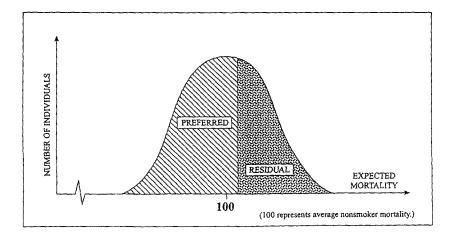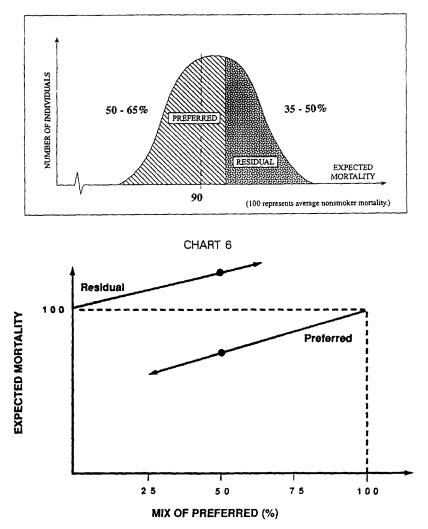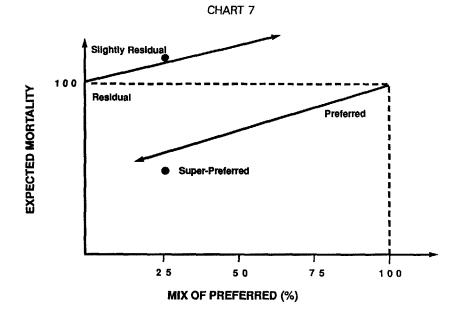CHART 1

CHART 2

CHART 3

CHART 4

We're already well into the third characteristic of preferred plans, the mortality differential allowed by screening items. Let's change our perspective to look at each of the respective ratios of preferred and residual mortality to aggregate mortality as a function of the percentage who qualify as preferreds (Chart 6). Let's discuss the trivial cases of 0% and 100% preferreds. On the left, the assumption of no preferreds results in residual mortality equal to 100% of aggregate mortality. On the far right, assuming 100% preferred results in preferred mortality equal to 100% of aggregate mortality. The arrows indicate generally the expected function values as the mix changes. Residual mortality increases from 100% of aggregate as more of the mix is identified as preferred and preferred mortality decreases for mixes identifying a smaller and therefore more select preferred group.

CHART 5

CHART 6

MIX OF PREFERRED (%)

As a nonscientific illustration of a more complicated function, I've made simple-minded use of data from John Bragg's recent article in the *Reinsurance Section News*. In John's article he describes a strict preferred model that identifies only 25% of the business as preferred and produces preferred and residual mortality as percent-ages of aggregates of 65% and 112% respectively. I've superimposed these values on Chart 7. The difference between his values and my rates could be because my extrapolation indeed should not be linear or because John's screens were somewhat different than my model or almost certainly a combination of the two.

CHART 7

I have assumed that the residual mortality is just the balancing item after preferred is extracted from the aggregate. Actually a company may want to also control the entrants to its residual class. It may feel that a risk that was borderline standard before and also has generated an adverse preferred profile is no longer acceptable as standard even within the residual class. Along this same line a company may wish to reduce the disappointment impact by holding down the rate differential between preferreds and residuals by cleaning up the residual class somewhat. Both of these approaches lead to what amounts to three classes: preferreds, favorable residuals and unfavorable residuals. One company has an explicit objective of eliminating the worst 10% from the residual class.

As one footnote to the concept of using preferred selection criteria to subdivide more highly rated classes, I'll mention that Lincoln's first application of profiling a risk using preferred-type factors was made in our reinsurance division. The objective was to identify the best out of rated facultative cases in hopes of reducing the rating. This was introduced in 1977. Our direct side picked up the profile process to identify the preferred standard risks about two years later.

A second footnote to this mortality section might be a word of caution to companies or product groups that do not offer a preferred structure. The preferred programs are arming the rejected insureds and their agents with information on their insurability. This could steer them to aggregate programs in hope of avoiding residual-level rates, yet these programs generally can't afford to load up with residual mortality. This phenomenon may also be apparent when you analyze your placed policies by class. It will be likely that your percentage of nonsmokers placed as preferreds is greater than the percentage anticipated from comparing your screens against an application base. Since many residuals will decide to go elsewhere for an aggregate rate or another shot at a preferred rating, this does not necessarily invalidate your original mortality assumption.

There seems to be a larger issue here. The industry, through its own action such as promoting preferred programs, and through outside influences such as the debate over the use of genetic information, sometimes opens up what has been traditionally a black box underwriting procedure. This tips the playing field in favor of the applicant and agent. With agents so knowledgeable about the information an under-writer receives, and considering that many agents control what an underwriter even gets to see, the underwriter is at a major disadvantage when it comes to trying to be as precise as is needed for many of the preferred programs in the market today. Fear of a cocaine screen results in positive selection, but having available a menu of different preferred programs, can lead to negative selection.

Companies seem to establish premium differentials, our fourth characteristic, in line with anticipated mortality differentials. When deviations occur they usually fit one of three patterns. First, a company may grant a preferred rate discount that seems generous compared to a screening process that isn't very discriminating. Alternately, a company may be reluctant to increase its residual class premiums sufficiently. Finally, the screening may produce mortality improvements that vary drastically by age, but the premium discounts are much more uniform. Each of these misadjust-ments is a potential threat to normal profits and should be scrutinized closely in light of other benefits of offering the program.

The underwriting and product design creativity behind these products has led to such a diversity of preferred risk programs that capturing homogeneous, industry-wide study data is next to impossible now and may remain so for years. The various combinations of number of screens, types of screens, cut-points of screens, and how strictly the screens are applied, produce nearly countless possible plan designs. For example, even if the mortality table makers are comfortable that two contributing companies handle preferred screening similarly, do the companies have similar philosophies for residuals as well? In fact, this effect is already confounding industry studies. A large number of companies include preferred nonsmokers in their submit-ted nonsmoker mortality experience, skewing the nonsmoker mortality downward. This is not always completely counterbalanced by also including the residuals. The best hope for good information probably lies in the analysis of subsets of the com-plete set of preferred programs. I refer again to John Bragg's recent article in which he brings up the problem of the many mortality tables required to represent a large number of preferred programs and mentions one approach to handling all these. The industry may also have to adopt this partitioned approach to be able to publish tables.

By way of summary I have these comments. A large number of screens will lead to a purer preferred group. A larger number of screens will invite more challenges from your field case by case. You should administer your screens strictly. Does the marketplace still view these programs as enough of a niche product to command a higher profit level? Perhaps. The bigger mistake would be to dial down your profit objectives as you introduce these programs. There will be plenty of threats to expected profits anyway.

I began my presentation by expressing the opinion that there was a lot more development potential in store for these programs. I arrived at this not by sensing some reasonable path that development would likely follow, but by noting all the obstacles in the way of designing the one, true, simple preferred program and at the same time knowing that these obstacles will merely serve as irresistible challenges to the creative and competitive underwriters, marketers, and risk quantifiers that make up your product development committee.

Before moving to our next speakers, the program allows for an "other" category. I'll offer a few topics of current underwriting interest and invite the audience to contribute others as time permits during the question and answer period.

At Lincoln Reinsurance, we receive several calls a week inquiring about insuring citizens of foreign countries, especially Mexico, when the writing company is not licensed there. There are several ingredients needed to make this successful and even then there is additional risk. In the best cases the applicant should have significant financial interests located in the U.S. and should reside here six or more months a year. Completion of the application and all medical testing should take place in the U.S. The producers involved should have relationships with the company broader than just the foreign national program. Even in these best cases there may be a question of the legality of the contract in the other country. More importantly, claim investigation can be very difficult without open cooperation of local officials. Even if good quality medical care is available in the other country, there is still possible extra environmental and accidental risk that may require separate mortality assumptions. In situations less controlled than just described, much of the success potential is in the hands of the controlling producer which may or may not make it an acceptable undertaking.

Another topic with a rapidly changing profile is the underwriting of jumbo risks. More and more companies are finding themselves in the large case market or at least are receiving cases much larger than they're used to seeing. The financial underwriting of these cases is very complex. They require additional reports and workup. A personal insurance case may suddenly jump to a business situation. Instead of just obtaining most Attending Physician's Statements (APS) from the last five years, every physician must be contacted. An additional problem with large cases is control of the application. For example, an agent seeking $20 million of coverage may send out four $10 million applications and plan to place the best two. But there exists the risks that three or four may actually be accepted, so most insurers and reinsurers will need to justify a $40 million line before agreeing to participate. Fortunately, some of the big marketing groups and others active in this market recognize the problem and are beginning to limit the use of this shotgun approach.

In another area of concern, some states are considering broad prohibitions to any use of genetic information by insurers. Recent developments in the ability to do deoxyribonucleic acid (DNA)-based testing have alarmed some consumer groups and regulators, but the industry has not yet sought to apply these tests. They do not meet our industry's usual standards of sensitivity, predictive value, or ease of administration. Unfortunately, other underwriting considerations such as family history are being included with genetic information and may be lost to us. The worst scenario is that the insured may have significant information that the company is not allowed to use. Ohio is giving serious consideration to this legislation with California and Wisconsin watching closely.

There's also strong interest in developing sound underwriting for older Americans. Lincoln and other companies have taken a close look at practices through age 70 or 75 and tried to gauge them for suitability at older ages. Underwriters, consumers, regulators, and producers are all contributing to this effort. At the moment, production at these ages is still pretty light.

Finally, the underwriting standards for aviation risks seem to be tightening a notch. While normal travel and major airline commercial pilots still command a standard rating, more and more private flying, whether as a pilot or a business traveller, is being rated. In addition, flat extras that used to be too small to impose, less than $2.50 for example, are now being charged. Differences in terrain, mountain versus plains, are being considered and data are emerging reinforcing the notion that there is a strong correlation between two or more motor vehicle violations and flying accidents.

I'd like to now turn the program over to Tom who's going to introduce recent developments in HIV and AIDS.

MR. THOMAS W. REESE: I'm going to speak on the AIDS epidemic's impact on insurance. I'm going to talk about four subjects: (1) U.S. AIDS epidemic trends, (2) U.S. industry claim trends, (3) HIV laboratory testing experience, and (4) U.S. industry HIV testing practices for underwriting issues.

No one knows for sure where the AIDS epidemic is headed, so first I want to review some AIDS epidemic trends. The official agency, the Centers for Disease Control (CDC) in Atlanta, produced a report published on December 25, 1992 that gives their most recent projections. Without giving numbers, the projections are slowing in the incidence of new reported AIDS cases each year. The 1991 increase in reported AIDS cases over 1990 was 5%. In 1992, the increase is 3.5%. (See Table 1.) The CDC is not talking in terms of reported cases, but of how many cases will be diagnosed each year. They report that from 1989 to 1990 and from 1990 to 1991, there was approximately a 10% increase in diagnosed cases. Even though it was a 10% increase in what they feel are diagnosed cases, reporting delays make it only a 5% increase in reported cases. The reported cases slowed down to 3.5 in 1992. Based on their CDC-type momentum projection, they are projecting a peak in the AIDS epidemic as early as 1994.

Table 1 is broken down by category of transmission type because this is how the CDC has been looking at it. The epidemic varies dramatically by different

transmission type. The epidemic is made up of mostly homosexual males, intravenous drug users, or both. A combination of all three transmission categories makes up 80% of the cases reported in 1992. It looks like this is at about a peak, with a 4% increase in 1991 and only a 0.8% increase in 1992.

TABLE 1
U.S. AIDS Reporting Increases

Transmission Type	1992 Cases	1991 Increase	1992 Increase
Homosexual/intravenous drug user	80.2%	4.0%	0.8%
Heterosexual	7.8	25.7	27.3
Hemophiliac	0.7	(4.7)	(2.5)
Blood transfusion	1.4	(18.5)	(4.7)
Other	9.9	8.6	13.3
Total	100.0%	5.0%	3.5%

The category still increasing strongly is heterosexual transmitted AIDS cases. This had an increase of 25.7% in 1991 and 27.3% in 1992. Those are the strongest increase rates. However, that is a very minor part of the AIDS epidemic and represents a relatively small 7.8% of the cases reported in 1992.

Hemophiliac and blood transfusion together make up a small 2.1% of the cases. They are clearly on the decline due to blood and plasma testing procedures that have been in place since 1986.

Of the 9.9% of the AIDS reporting cases in the "other" category, 1% represent cases from persons born in pattern 2 countries. In pattern 2 countries (like Africa and Haiti) the ratio of male to female AIDS cases is about 1 to 1 and AIDS is very much an epidemic. Some 1.6% are pediatric cases under age 13, and 7.3% are called "Other/Undetermined." When the cases are originally reported, it's often not possible to sort them into other transmission categories. Later, follow-up studies are done to put them into other categories. Eventually much of this 9.9% will be put into different categories as more is known about the cases.

There is considerable uncertainty about the future increase rate. The midpoints of the main CDC projections result in an increase rate that is lower than 3% by 1994 and the CDC says that the epidemic could peak by 1994. However, there is concern about exactly what is driving the lower increase rates. A big cause, in many ways unmeasurable, is therapy treatment and drug treatment that have been able to slow the progression of the disease for many individuals starting about 1987.

One sensitivity test in the CDC's model is concerned about the slowing in AIDS progression rates because of therapy treatments. If the therapy becomes less effective among persons treated for extended periods, like four, five, or six years, then this plateauing of the epidemic by 1994 would not happen. In fact, the model would show significantly increased AIDS cases. On the other hand, new AIDS treatments are being researched and developed. If new therapy comes along that has even

better treatment, it is possible that the number of new diagnosed cases could even go down.

Table 2 breaks down the different transmission types on the left and shows what percentage of total reported cases they represented in different years. The homosexual population, which was the first population identified with AIDS and made up virtually all of the initial cases, represented 56% of AIDS cases reported in 1988. That has been steadily declining to 51% in 1992. Intravenous drug users have been nearly constant at about 24%. The combination of both homosexual male and IV drug user fell from 6.6% to 5.2%. Heterosexual cases have risen from 3.8% of reported cases in 1988 to 7.8% of those reported in 1992. Hemophiliac and blood transfusion cases have decreased from 3.6% of reported cases in 1988 to 2.1% in 1992.

TABLE 2
U.S. AIDS Reporting Distribution

Transmission Type	1988 Cases	1990 Cases	1992 Cases
Homosexual	56.3%	54.8%	50.8%
Intravenous drug user	23.5	23.1	24.3
Homosexual and intravenous drug user	6.6	5.3	5.2
Heterosexual	3.8	5.3	7.8
Hemophiliac/blood transfusion	3.6	2.8	2.1
Other	6.1	8.8	9.9
Total	100.0%	100.0%	100.0%

One caution about "Other/Undetermined" is that a big portion of the 9.9% reported cases in 1992 was undetermined. They will, over time, be distributed to other transmission types. When I give these figures, they reflect the number that was in existence still undetermined at the end of the calendar year of reporting, except for 1988. That data had aged a year, so that's why it's less. In fact, the number of undetermined in 1988 in these numbers is only 3.1% compared to 6.0% and 7.3%.

Beginning in 1993, there will be a huge increase in AIDS reporting. I've already had some questions about the news report that there were 35,000 AIDS cases reported in the U.S. in the first quarter of 1993. Thirty-five thousand is 75% of the 47,000 cases reported all last year and so without realizing what's taking place you'd think, "Wow, there's some big explosion in the AIDS epidemic." What happened is that the CDC liberalized their definition of AIDS diagnosis so they pick up the AIDS cases earlier in their stage of progression to final disease. The new definition, effective January 1, 1993, now defines AIDS in terms of low CD4 T-cell blood count; it is a condition rather than a qualifying disease. A patient can still be asymptomatic, but have this low blood count and now qualify for AIDS diagnosis. The CDC estimated in their paper at the end of 1992 that this could raise the number of reported cases (diagnosed cases) by 80-100%.

We have to be careful when we're moving forward and looking at AIDS cases. The CDC will continue to report the number of people who have been diagnosed under the pre-1993 definition and the number of people who will be under the 1993

definition. You have to watch that the number of cases being reported under the pre-1993 definition is not the same as if the definition had never changed. The CDC doesn't go back in time because someone was diagnosed under the 1993 definition. They don't go back and then switch him to the other definition. I've seen some people stating that the epidemic already peaked a few years ago, because they've been watching the pre-1987 definition decline. But, if we never had the 1987 change in definition, a lot of those people would have been eventually diagnosed under the old definition anyway. So, we're just taking an earlier look at the epidemic.

Moving away from U.S. AIDS epidemic trends as a whole, let's examine industry AIDS claims experience in the U.S. The data in Chart 8 come from the familiar data that you've seen from surveys taken by the American Council of Life Insurance (ACLI) and the Health Insurance Association of America (HIAA). The estimated total AIDS claims have risen from just short of $300 million back in 1986 (these are grossed up estimated claims) to $1.3 billion in 1991. That's a five-year average growth rate of 35%, although you can see by the bend of the graph that the growth appears to be slowing. In fact, it looks like claims increased at an average 50% rate for the first three years, from 1986 to 1989, and the last two years they've been growing at 14% a year. A main reason why we see the lower growth rate in the last year is due to group accident and health (A&H). Group A&H had $455 million in claims in 1991, which represents 34% of total, and has had level claims for the last two years. It grew by 75% per year for the first three years and then leveled out. That's the big reason why claims are looking level.
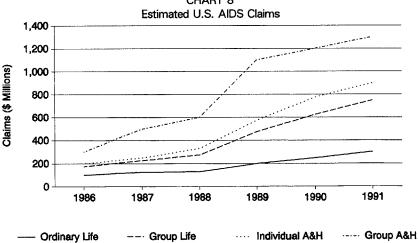
CHART 8
Estimated U.S. AIDS Claims

Ordinary Life ―― Group Life ⋯⋯ Individual A&H ⋯⋯ Group A&H

Source: Data from ACLI/HIAA Surveys

The next largest category is group life. It had $419 million in claims in 1991; 32% of total and group life grew over the first four years. From 1986 to 1990, it grew 47% a year, but last year it rose only 12%. Both group life and group A&H have had the

most rapid growth rates historically; however, group A&H is slowing (in fact it hit a plateau for two years).

Ordinary life is the next biggest category at 26% of the total and representing $337 million of claims in 1991. All the lines have improved in slower growth rates. Ordinary life averaged a 34% growth rate for the three-year period to 1989 and has been growing at 23% for the last two years.

Individual A&H represents 8% of the total with $107 million of claims in 1991. This line experienced a 31% growth in the first three years and a 16% growth in the last two years.

The next way to look at the ACLI data is to look at ratios of AIDS claims to total claims, instead of the absolute number of claims and dollar amount of claims (Chart 9). These graphs are showing the ratio of claims. The individual and group A&H lines have plateaued over the last two years at around 1.3-1.4% of claims. That's a striking plateau after having increased from half of those rates in 1986. Ordinary life continues to increase about 0.3% a year, reaching 2.3% AIDS claims to total claims in 1991, and it has been steadily increasing 0.3% a year. Group life started at the same rate as ordinary life in 1986 (0.9% of claims), but it has been growing at twice the rate (0.6% a year), so that it is 3.9% of claims.

Those are industry AIDS claims trends. My third subject is to present data on HIV testing results from testing labs. I asked for and received data from Home Office Reference Lab (HORL) and from Osborne Lab to look at the variation in testing results by different indicators.
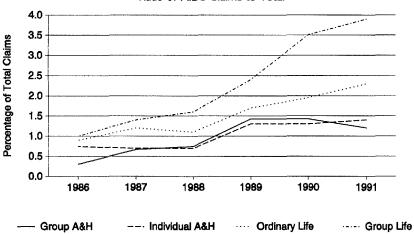
CHART 9
Ratio of AIDS Claims to Total

Percentage of Total Claims

—— Group A&H   — — Individual A&H   ···· Ordinary Life   —··— Group Life

Source: Data from ACLI/HIAA Surveys

The first is HIV positive rates varying by issue age (Chart 10). The bars on this chart show how many tests, out of 10,000, are going to be positive (the reactive rate for 10,000 tests). For issue ages 20-39, the two youngest groups on the graph, the reactive rate is about 7 or 8 per 10,000. That drops to 5 in the 40s and 3 in the 50s and 60s. (One note about this chart: HORL did not provide data for ages 60-69. That's not zero. It's just not applicable.) The reactive rate decreases with age and that's not surprising. This is roughly the pattern of incidence of AIDS deaths by age that you would see in the U.S.
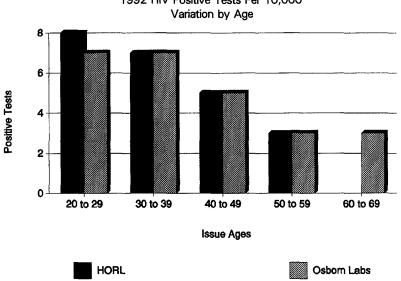
CHART 10
1992 HIV Positive Tests Per 10,000
Variation by Age

The more striking variation is when you look at policy size (Chart 11). The first bar is issue amounts of at least $25,000 but less than $50,000. The reactive rate is over 20 per 10,000. That declines and by the time you hit exactly $100,000 issue amount, the reactive rate has decreased to about 6 per 10,000, which is the average for all cases tested by these two labs in 1992. These are 1992 statistics. The reactive rate continues to fall to 5 per 10,000 for amounts that are over $100,000 but less than $250,000. It falls to between 2 and 3 for $250,000 or larger, but less than $500,000. By the time you get to $500,000 or higher policies, we're having a reactive rate of only 1 per $10,000.

There are three main reasons hypothesized for the decline of reactive rate by issue size: (1) lower socioeconomic groups are hit harder by AIDS than other groups and tend to be correlated with smaller issue amounts; (2) there has been a lot of publicity about HIV testing -- the larger amount issues expect to be scrutinized for HIV testing (perhaps at the smaller amounts there was less expectation of having that blood sample tested for HIV); and (3) many insurance companies' testing limits are dropping off at $100,000 or something like that.

The third way to look at HIV testing lab experience is by state. Chart 12 shows the highest cases in HORL data. District of Columbia doesn't show because its reactive rate was 43 for HORL, double anything on the graph. Osborne was 73, way off the chart, for District of Columbia. The second highest jurisdiction is Puerto Rico, around 20 per 10,000. (Remember the average was 6.) The next tier is a group of states:

CHART 11
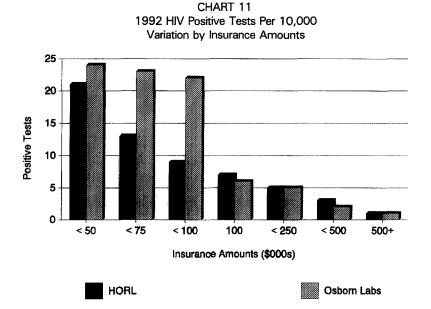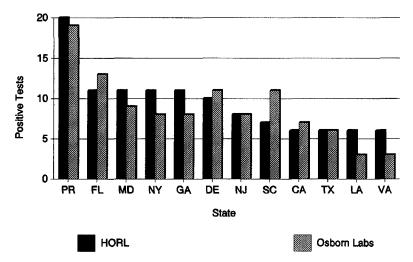1992 HIV Positive Tests Per 10,000
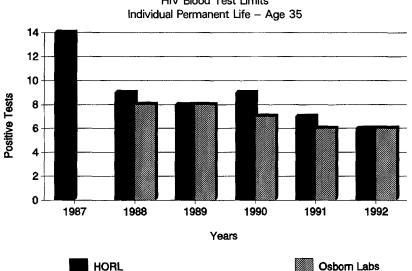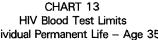Variation by Insurance Amounts

CHART 12
1992 HIV Positive Tests Per 10,000
Variation by State

Florida, Maryland, New York, Georgia, Delaware, New Jersey, South Carolina. There are variations, but they are roughly in the range of 8-11 reactives per 10,000. Surprisingly, big states that have traditionally been AIDS problem-type states, like California, Texas, Louisiana, and Virginia, come in at the average of 6 per 10,000. They are just like the average test cases. I didn't graph the low states, but the data continues on down. There are 5 states at only 5 per 10,000, and 10 states that have reactive rates of only 1 per 10,000.

Chart 13 shows the historical trend by calendar year. The trend is downward. In 1988-89 the reactive rate was about 8 per 10,000. That has fallen to only 6 per 10,000 in 1992. HORL was able to provide data for 1987, when HIV testing limits were just beginning to come down to modern levels, of 14 per 10,000. Throughout 1987, the median testing limit was about $250,000. By 1988, it fell down to the more modern $100,000 level.

CHART 13
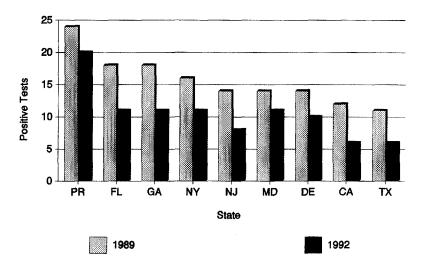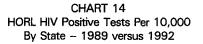HIV Blood Test Limits
Individual Permanent Life – Age 35

This is a downward trend in AIDS cases. I can't say that is reflecting a downward trend in the incidence of HIV-infected populations (people in the country). More likely, this is an underwriting preselection effect as people know they're going to be tested. If they are HIV positive, they tend not to apply for insurance. That is demonstrated by looking at HORL data (see Chart 14), which shows the reactive rate by state for those high states. We looked at most of the states from 1989 to 1992. Remember, the average 1989-92 reactive rate fell from 8 to 6 which is a 25% decrease rate. Most of these states fell by a lot more than that. Again, District of Columbia is not shown because of scale. In 1989, it was 92 per 10,000.

It fell to 43 for HORL and 73 for Osborne. With an average decline of 25% for all testing reactive rates (the reductions were in the 30-40% range in reactive rate for the high states), their reactive rate fell by 50%. High states, such as California,

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Texas, and District of Columbia, were among the highest AIDS incidence states. Clearly, a lot of the effect is preselection by individuals who are not applying for insurance because they know that they are going to be tested.

CHART 14
HORL HIV Positive Tests Per 10,000
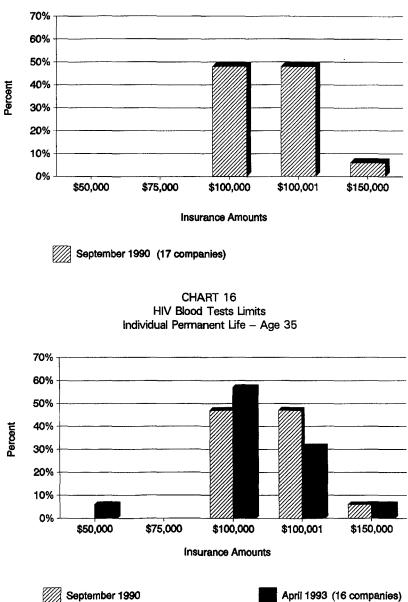By State -- 1989 versus 1992

There is other evidence of preselection in the HORL results for Canada which showed a reactive rate of 5 per 10,000. That's not a lot different from 6 per 10,000 in the U.S., yet the incidence of AIDS in Canada is thought to be statistically about one-fourth what it is in the U.S. The U.S. has a four times proportionally larger AIDS epidemic, yet shows about the same reactive rate as Canada. This indicates some preselection.

My fourth and final topic is U.S. individual life insurance testing practices. Since 1986, Tillinghast has conducted a series of surveys among the top writers of individual life insurance. I'm just going to update the data from the last time I took this survey in September 1990 (Chart 15). Our survey had 17 companies reporting about two-and-a-half years ago. Of those 17, 16 were testing, in all states, at around the $100,000 level. Half of those 16 tested at exactly $100,000 and over. The other half tested at $100,001 and over. That extra dollar makes a big difference. It could mean doubling the amount of your tests when you go down to exactly $100,000. Only one of the 17 companies tested higher than $150,000 by 1990. (By the way, testing practices vary by issue age; this is for issue age 35.)

Chart 16 shows a comparison. We show a shift in April 1993, where about one-fourth of the companies in this survey have reduced their testing limits in all states. (One of the companies dropped out so there are 16 companies.) Only 37% have a testing limit at more than $100,000. Some 57% tested exactly $100,000 and one company even moved to testing all issues.

CHART 15
HIV Blood Test Limits
Individual Permanent Life -- Age 35

September 1990 (17 companies)

CHART 16
HIV Blood Tests Limits
Individual Permanent Life – Age 35

September 1990   April 1993 (16 companies)

While this is a shift for all states, there is a more important trend. This is the testing limit for your least likely state, a low incidence state. The testing practice for both 1990 and 1993 is that 56% of the companies have established a higher tier of states. If the application is coming from these states where AIDS has been more of a problem, then they have stronger testing limits in those states. The testing limits have shifted to the left for these higher tier states (Chart 17). This is a striking difference because 38% of the companies test at $50,000 or $50,001. It's about half each way. Some 12%, or one company, AIDS tests at $75,000 and $75,001. Half of the companies in these high tier states, like California or Texas, are going to be testing under $100,000. Some 38% tested at exactly $100,000 and above. There are only two companies in these high AIDS case states that are testing at over $100,000, beginning their limit there. By the way, 9 out of the 16 companies are from high AIDS states.
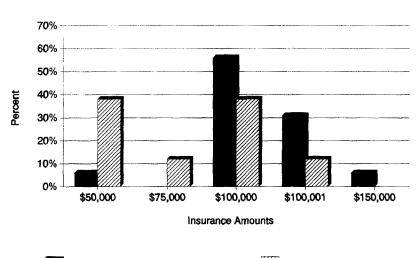
CHART 17
HIV Blood Test Limits
Individual Permanent Life -- Age 35

Different companies had different definitions of exactly what is a high-tier state. Ten companies include District of Columbia, nine include California and Florida, eight include New York, seven include New Jersey, and six include Texas. All of those states would be in everybody's high-tier states. The reason some companies don't have it is because they don't write in those states. Georgia, Maryland, Puerto Rico, Illinois, and Nevada, the next tier down, are mentioned by three or four companies as being in the high tier. There are 15 other states that are included by one or two companies in their high-tier definition.

The previous survey, in 1990, showed 5 out of 17 companies had lower test limits for term insurance, but by 1993 only two companies had lower limits for testing for term insurance. The reason is that the other companies have either raised term

insurance limits up to their testing limit, or reduced their testing limit down to term insurance. Based on this survey, the primary practice is to test all term insurance. The majority of companies in the survey do that.

What are these tests they're running? I'm just talking about HIV, not about all the other tests. Some 38% of the companies use dry blood spot testing for the first tier of their testing. They might begin at $100,000 with dry blood spot and then switch to venapuncture at over $150,000 or up to $1 million. One company uses the microtainer blood sample containing about six to eight drops of blood for its lower-tier testing and then switches to full venapuncture later on. In the 1990 survey, there was a lot of talk about switching from blood testing to urine or saliva testing. A few companies, roughly about a quarter of the survey, did use urine for a time as a screen until it was disapproved by the FDA. I didn't find any companies that had used the saliva test. Some were interested, but because of the FDA's disapproval on the grounds that these tests could not be confirmed by the sample, and because the FDA strongly recommended that a medical professional take the samples, urine and saliva tests are generally not being used now.

Finally, a further testing issue is whether to test for the HIV2 virus which is very minor in North America right now. HIV2 virus is a variant that is common in West Africa and is not included in the standard tests. The CDC expects there are only 100 HIV2 cases existing in North America and none of them are homosexuals or intravenous drug users -- the main transmitters of the HIV1 epidemic. A possible reason to test for HIV2 is that blood donations have been routinely screened for HIV2 since mid-1992. Physician testing for HIV2 is recommended for persons with epidemiological risk factors for HIV2 or where an illness suggests HIV infection but the person is negative for HIV1. Some big cities are beginning to test for HIV2 and at least one of the testing labs is beginning to screen for HIV2 as well as HIV1.

DR. ROBERT L. STOUT: I would like to clarify a couple of issues in the two previous talks. The first is about smoking and evaluation of people, at least at the laboratory level, as to smoking status. We ran a small survey a year-and-a-half ago in which we looked at 35,000 people. They were selected on the basis that they said they did not smoke and used no tobacco products. We looked at those 35,000 people in the screening assay. It's immaterial in the way we screened it. We used an antibody/antigen reaction. We found that more than 6% of those people either misunderstood the question or checked the wrong box inadvertently. An inadvertent oversight, but it turns out that a substantial number of people still misinterpret that question. Obviously, if we are charging a differential of 50-100% in price, we're basically giving away 3% of our policies free if we take applicants at their word. Something you need to reinforce to your underwriters from time to time is that when the lab comes back and reports these things as positive, that's the way it is.

The second issue is regarding our HIV status for 1991. I know Tom talked about prevalence for HIV, but I want to refer to the positive hits per 100,000 applicants. We look at the East Coast and it is all very large numbers starting in Florida at 360 or Puerto Rico at 410 and topping out with Washington, D.C. at 770 per 100,000. We set, in our mind's eye, what we consider to be high-risk states. We look at what CDC suggests as high-risk states and feel very comfortable in going out and testing in those states that are described historically as being high risk. Yet, look at a state like

California where the prevalence is only 180 hits per 100,000. Education is the reason. The people in California understand the risk. They also understand something else which was alluded to by Tom. You don't apply for an amount of insurance for which you're going to be tested.

How did I come to that conclusion? Tom indicated that back in 1989 we started testing urine for HIV. In 1989, we had one very large carrier in Hartford consult with the State of New York and the State of California about using that as a screen. Both states agreed. Before using urine, that company had a prevalence in the State of New York of 23 cases per 10,000. They started using urine at smaller sizes, implying a lower socioeconomic class – a $50,000 to $100,000 policy amount. We had 78 cases per 10,000; more than threefold. Within 90 days after starting the test, the rate was back down in the 23/24 range, the same that we had found with serum. People understand the process.

A similar example could be cited for cocaine. We had a company that decided it was going to have agents collect samples. Everyone cringes at that, but we set it up. They had a restriction on agent collection. The agent had to have been with the company at least five years, been a career agent, and had no exceptional claims experience. Guess what we found when we started looking at urine collected by agents? Smoking status was equal between those collected by agents and those collected by parameds, about 21% for this company. Proteinuria and glucosuria were equal. What about cocaine? We found with cocaine that with paramed collected samples we had 1% and with agent collected samples we had 2%. It's not a hard test to prepare for. All you have to do is stay away from the substance for a very short period of time, maybe two to three days, and you make it. I think that lays to rest some of the fears we have about agent collection, but you really have to be on your guard.

Before I move into my formal talk, I'll give a little reminder about sensitivity, specificity, prevalence, and positive predictive value. Positive predictive value is based on the sensitivity/specificity multiplied by the prevalence of the disease in a population we have to look at. You'll note, depending on the prevalence, that positive predictive values can be anywhere from 95% down to as low as 16%.

My topics are topics with which all of us deal. I didn't go through and pick something out that my lab's doing and your lab's not doing, even though I've been slighted somewhat. The two topics I've chosen to speak on are: microalbuminuria and the diabetic and prostate specific antigen (PSA) testing.

The data on prevalence is from Jibb Laboratories and Clinical Reference Laboratory (CRL). Each year we present data to the Association of State and Territorial Laboratory Directors in Public Health. Each year we combine our data on prevalence and present it. That represents about 850,000 samples in total, so it is a good statistical base to work from.

Diabetics represent a special class of applicants, a special risk of applicants, and historically we've been concerned about this group. Fifteen years ago, when I first came to this industry, diabetics basically couldn't get insurance except at extraordinarily high rates. The rates are still high, but things have changed in the last 15

years. We now have a method, at least at the laboratory level, to identify diabetics into individuals that we would consider to be more preferred in that the probability of a dastardly fast progression of their illness is substantially lower. This takes us beyond the traditional urine test for glucosuria and proteinuria in which we look for the presence of glucose or proteins in the applicant's urine.

As an example, assume we have two people each applying for $1 million insurance. We will look at the amount of glucose in their serum. Both of them have serum glucose levels of 190. We do A1C determinations and they have A1C levels of 7.5. That's not really terrible for a diabetic. We look at the protein levels in the urine. Let's assume there is basically no protein present in either one of these two urine samples.

A new marker, microalbuminuria, was introduced about three or four years ago. "Micro" doesn't mean that it's a smaller molecule of albumin. It simply means that we're measuring albumin at lower concentrations than what we have historically. We look for this molecule in these two applicants. One of them is positive for micro-albuminuria and the other one is negative. Clinical progression in these two cases is likely to be substantially different.

In the early stages of the disease, there is very little leakage of protein from the kidneys. You'll recall that when we look at diabetics, half of these individuals will develop kidney disease – the chief complication to the diabetic. Next to cardiovascu-lar disease, it is what kills 40-50% of diabetics. So, when we look early on, there's very little protein being spilled by the kidney. The kidney is basically functional. What's been demonstrated in the literature is that looking at this small amount, gives you a reference point. We usually use 10 milligrams per centiliter as the cutoff point before we start calling this person positive for protein. What has been demonstrated is that if a person is anywhere above 40 milligrams per centiliter of microalbuminuria, he or she is at increased risk of renal disease.

We can differentiate this group into two groups – those with a rapid clinical progres-sion and those who appear to retain normal renal function. That is very important as far as risk assessment goes. Right now, we lump all of these people together. This provides a vehicle where we can identify the diabetic who will have a more benign course.

What does it indicate long-term? Clinically, diabetics are divided into three stages. Stage 1 lasts somewhere around 10-11 years. Stage 2 is the rapid increase or progression of the disease. Stage 3 is usually only two to three years in duration. Using this new marker, we identify people who have diabetes and are in this very early stage. Diabetes onset increases with age. Using this marker, we can segregate those two populations -- one at lower risk and one at extremely high risk.

We start looking at real people and find that this marker also affords us one other opportunity. Currently, we report protein findings back to the underwriters or medical directors. Let's say a protein finding may be as high as 120 milligrams per centiliter. Obviously, that causes a great deal of concern, but using this new marker we are able to differentiate those people with glomerular failure, those involving the filtration network of the kidney as opposed to those who have tubular proteinuria, failure to

remove the protein from the urine during its filtration. As the diabetic tends to lose more and more albumin, we get to a point where renal failure ensues and the clinical course is much more severe.

My second topic is prostate specific antigen (PSA) testing. This is a marker described back in 1976 for prostatic carcinoma. About three years ago, we started using that marker in the industry. We start by looking at statistics of occurrence for cancers. We see that there has been an increase in the number of cancers diagnosed in the last 10 to 15 years. There is a multitude of reasons why that may occur. The true incidence may be increasing much the same way that we're seeing with HIV or it may be the result of the change in the definition and the reporting of the disease.

Lung cancer has the fastest increasing prevalence in both genders. If we could find a good marker for lung cancer, we'd all be better off. The difficulty with markers that look at lung cancer is that nothing really has the requisite sensitivity and specificity to be useful. The PSA markers, on the other hand, should prove to be extremely useful because of the prevalence of the prostate cancer, which is the second leading cause of cancer in men, following lung, in the population of interest -- males over 60 years of age.

We basically write more insurance policies on males right now than on females, especially in the higher dollar group. So, we have a tremendous interest in identifying markers that might help us identify people that are at increased risk for this disease.

There's an old saying in pathology: "If you live long enough and you're a male, you'll have prostate cancer." Looking realistically, starting at age 30, Sue Szalaski at CIGNA quotes a statistic of 30%. I have seen that number as high as 50% in men 50 years of age and older who have foci or cellular aggregates of this cancer present in the prostate. Certainly by the time you're 80 years old, 50% is very low. If we find the tumor early, the survival rate is very good. If it has not egressed past the gland itself and it is not metastatic, the survival statistics are very good. Looking at the five-year survival statistics for whites and blacks, we find that localized types A and B is roughly 80-85%. Regional is somewhere in the 60-70% range. Once the disease becomes metastatic, the five-year survival rate is only 20-30%. Again, this is another reason why we're looking at this particular marker.

What makes this marker highly useful? One, it's an extremely stable protein. You can boil it. You can put it in the back of your truck and carry it around. You can forget to centrifuge it -- or any of the things that parameds forget to do from time to time. You can still go back and assay for that marker, and it's still there. It's a very tough molecule. Elevations, however, may be caused by benign conditions such as hypertrophy (increase in size) of the gland. It's the only gland that males have that increases in size with age. Everything else shrinks, including our brain. As we age, the prostate tends to increase in size.

There was a case reported in last September's issue of *Lancet* of a gentleman who was 76 years of age, has an 86 nanograms per ml concentration for this marker, and has benign hypertrophy of the organ. That's the highest ever reported for a person who didn't have cancer of this organ. Degree of elevation normally correlates with the burden of disease -- the size of the tumor and its dissemination. There is a recent

article in *JAMA* and also *The New England Journal of Medicine* that describes this marker as the most useful single marker for screening men for prostate cancer. It is compared with the digital rectal exam and also with transrectal ultrasound. It appears to be the most useful single marker.

In talking to John Yacavino over at New York Life two years ago, we might have seen 2% or 3% of the attending physicians statements (APSs) coming through with PSA values on them. Today, 50-60% of APSs that come through for men older than 45 years of age have PSA values associated with them. As a direct result, we have a risk of being antiselected against by individuals who are tested and never admit to it. As a consequence, more and more companies are moving to use this marker.

If we go down to four nanograms, sensitivity (the ability to find people who have the disease) is only 57%. We're missing about 40% of the people who have cancer even if we use four nanograms. At 10 nanograms, it's only 23%, but the specificity (the differentiation between people that are truly negative and those that are positive) is up to 96%. Most clients are using the marker at 10 nanograms per ml. At values between four and ten, they advise the applicant that they have an abnormal reading and should see their doctor for a workup. Most companies are now deferring these applicants at 10 nanograms and above pending a thorough urogenital workup.

If we look at prevalence of the markers in the general population at ages over 50, we have approximately 2% of males that test with PSA values greater than 10. Our first two cases at CIGNA were two gentlemen who had combined policies pending of $5 million. This occurred in the first 30 days that we were running this marker for them. These two people had the marker present in excess of 50 nanograms apiece and both of them upon examination had prostate carcinoma. So, the marker does work.

Here we are, as insurers, acquiring all types of medical information in the process. We, as lab rats, certainly analyze the samples that are submitted. You, as insurers, underwriters, and medical directors, file those things away. Unless we have something truly abnormal like this, we never supply it to a client. I think we really miss an opportunity. We have information on cardiovascular disease, cholesterol, triglycerides, and glucose that should be provided to every applicant that is tested. No one in this country has more interest in their health than do we. We insure them and if there is anything we can do to make them healthier, we should do it. We have a few client insurance companies that actively send Lipid profiles back to applicants. I would encourage all of you to see if that is a possibility, because again no one has a greater interest in the health of these individuals than do we.

MR. ROBERT F. DAVIS: I'm wondering if any or all of you read a recent article in *The Wall Street Journal* by someone who said that healthy people who have a good immunology system will never progress to AIDS from HIV. Does anybody buy that article or did anybody even read it? The hypothesis was that if you maintain a healthy lifestyle and do not damage your immunology system, you will have a very good chance of never getting AIDS or won't get it for many years.

DR. STOUT: On the status of immune systems, it is like the old saw on cancer. Some people just tend to be healthy. For example, a lab technologist at CDC becomes infected due to an exposure to a concentrated virus and becomes ill.

There's no reason to believe that person had an impaired immune system at the time of exposure.

Look at some of the population, spouses of U.S. military personnel for example, who have become exposed. Typically, women tend to progress far more rapidly with this disease than men. Maybe it is the viral burden they are first attacked by. There's no scientific explanation, but the disease progresses more rapidly in those people who have been basically healthy at the time of exposure. Certainly people who have concurrent insults – the drug abuser, the person whose lifestyle lends itself to infection – have far more rapid escalations in the clinical course than what we would consider average.

MR. CHRISTOPHER J. NICKELE: Tom, you had indicated that the CDC was predicting a peak in AIDS incidence in 1994. Given the relative differential in the size of the homosexual and IV drug user population, as compared to the heterosexual population, there would appear to be rather large increases within the heterosexual population. Isn't it possible that could just be a local peak and not a true peak?

MR. REESE: The CDC is careful about its predictions and they are not making long-range forecasts. It's time horizon is about five years at the most. The only way you could get a local peak in the epidemic, meaning the homosexual/IV drug user epidemic is over but a heterosexual epidemic is out there someplace, is if the heterosexual epidemic is really going to develop into its own epidemic. Again, nobody knows, but I would say based on the evidence that it doesn't look like it's going to happen.