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## **Recent Trends in Individual Life Mortality**

**Track:** Product Development/Reinsurance

**Key words:** Product Development, Reinsurance

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**Panelists:** MARY J. BAHNA-NOLAN

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*Summary: What has been happening with mortality lately? Recent trends in individual life mortality experience, including the experience of larger amount policies, are explored.*

**Mr. Paul A. Schuster:** I'm with the Reinsurance Group of America. I do want to introduce our four speakers in the order of their presentation. First up is Al Klein. Al is an assistant vice president at CNA Life Reinsurance. Al is also chairman of the Task Force on Preferred Underwriting and Large Amount of the Society of Actuaries (SO), and his remarks will be focused on the activities of that task force. The second speaker is David Bragg. He is the president of Bragg Associates. Many people are familiar with the activities of both David and his father Jack, who publish some wonderful and quite useful mortality statistics. Our third speaker is Mary Bahna-Nolan who is director of consulting and development, The Americas, at Transamerica Reinsurance. Mary will be talking about the impact of the emerging data and the impacts beyond, let's say, just underwriting standards. She'll discuss agent involvement and the impact agents can have in your preferred mortality. Our last speaker is Jay Biehl, second vice president at Lincoln Reinsurance. He is involved in research and development. Jay will be talking about the impact that exceptions can have on your mortality when you make exceptions to your preferred guidelines.

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†Mr. Bragg, not a member of the sponsoring organizations, is President of Bragg Associates in Atlanta, GA.

I'll tell a little story before we get started. When I was asked to be the moderator for this panel discussion, I thought the topic was really quite timely. As a reinsurer, we see a fair number of opportunities to quote on products these days. In conversations with my contemporaries, I found that many people had some mortality data on their preferred classes, and you sort of remember who was sending you what during the quoting process. So I quickly got on the phone and called many of the people that I know fairly well, and they were all enthusiastic about the topic, but most of them weren't sure they wanted to stand up and talk about their own experience. It's kind of a shame. I hope we can work towards sharing some of this information as a long-term goal.

**Mr. Allen M. Klein:** What I plan to do is provide you with a brief history of the Preferred Underwriting Task Force, go over the results of the preferred underwriting survey that we did, and then also fill you in a little bit about what the task force is working on with respect to a preferred mortality study. First, I'll give a brief history. The task force was formed in early 1995 with a two-pronged mission. The first was to determine the criteria and assumptions used in preferred underwriting through a survey. The second part of our mission was to determine the feasibility of doing a preferred mortality study.

We completed a survey of preferred practices in 1995, and did another one in 1997. The 1995 results were released in mid-1996, and I expect the results of this survey to be out in early 1998. We mailed the surveys to both underwriters and actuaries, as it is very difficult for any one person to complete the whole survey. The SOA compiled the data to maintain confidentiality. I did not want any of the task force members to be able to identify individual companies. I found out recently that we actually have another company that has the results for our survey, so now 61 companies responded to our survey that they had at least one preferred class. What we asked for was information on ten-year level term products, as of April 1, 1997. Of the 61 companies, 26 participated in the last survey as well. As you're going to see from the results, not all companies responded to all the questions.

I have a few caveats before we get started with the results. First of all, I'm going to make some comparisons throughout the presentation, and the comparisons are going to be based on the overall results from one survey to the other. These may or may not be appropriate comparisons. We have not had time yet to take a look at the results from the 26 companies that were repeated, to see if there are any real trends there. We will do that for the final report.

As you know, the results are preliminary. I don't expect significant changes in the final results from what you're going to see here, but there may be some slight

changes here and there. The data, while comprehensive, is not representative of the full industry. There are a few big preferred writers that did not participate in the survey. We did review the data for inconsistencies, but we did not completely verify it. The purpose of the report is to detail the result and not to try to pass judgment. In other words, we did not take a look at the preferred criteria that we were given, relate that to the percentage expected to qualify for preferred, and try to match those and see if it was consistent. We're just reporting on results. Finally, and what's most important is that the data are not intended for the industry to set prices or criteria.

Now let's take a look at the results. First of all, in terms of the number of rate classes, we still have most companies using three or four rate class products, although there is a trend toward more classes. In the last survey, there were more three-rate class companies than four-rate class companies, and that has changed. In the last survey, there were only three companies that had five or more classes, and now there are nine.

Let's discuss a comparison of actual and expected results, and this is expected percentage to qualify, and it's for the best preferred nonsmoker class. The results here are very similar to the last survey, but the expected percentages are a little bit lower this time. Comparing actual to expected, there were 20 companies, or a little over half that had actual results greater than expected. Twelve companies had actual results less than expected, and seven had actual results about equal to expected. When I say about equal, I mean that if they were within 2% of what they expected, I called that equal.

On the average, the actual is a little bit greater than expected. This is something that I would expect. As companies come out with preferred products, or even new preferred products, the agents tend to bring the better risks forward. Also, there's a higher not-taken rate for the standards, which also leads to more lives going into the preferred class.

Let's discuss best smoker class, actual and expected. The results are very different from the last survey. In fact, on the last survey, there were only two companies out of 17 that had expected results less than 39%. So companies are assuming a lot less are going to qualify for preferred. Also, by comparing actual to expected, five companies have actual results that are greater than expected. Fifteen are less than expected. Using my same parameters, 19, or almost half, had actual results matching what they expected.

Expected mortality is somewhat lower than the last survey. In other words, companies are assuming expected mortality a little less than before. There is one

interesting thing, though. In the last survey, there were three companies that had expected results for a duration one of under 30%. The best nonsmoker class, age 45, says the basis is the 1975–80 table.

I didn't have enough time to check and see if those three companies are gone from this survey, or if they've actually increased their rates. In terms of movement from duration one to six, 11 companies were consistent between the two durations, 22 increased their assumption from duration one to six, and 17 lowered it. So you have a real mixed bag there. In terms of the survey itself, we did ask companies for other ages and durations, and those will be shown in the final report. In terms of maximum issue age and minimum face amounts, the maximum issue ages range from 60 to 85, with the majority at 70. Minimum face amounts qualifying for preferred ranged from \$25,000 to \$250,000, with the majority at \$100,000. These results are very consistent with the last survey.

Now let's take a look at blood profile testing in Table 1. The number of companies shown reflects the number of companies that use blood profile testing for determining preferred at the various ages and face amount levels. As you can see, the usage increases with increasing face amounts, but does not vary very much by age. The oral fluid testing results are shown in Table 2 and they surprised me a little bit, but I expected there to be more companies using oral fluid testing. I think there is an increasing trend, even though these tables might not reflect it. Urine testing is shown in Table 3. Blood profile and oral fluid testing are other testing methods for preferred.

TABLE 1  
BLOOD PROFILE TESTING

Face Amount	Issue Age	# of Companies
\$50k	25	11
	45	14
	65	18
\$100k	25	48
	45	49
	65	48
\$250k	25	58
	45	58
	65	57

TABLE 2  
ORAL FLUID TESTING

Face Amount	Issue Age	# of Companies
\$50k	25	4
	45	5
	65	0
\$100k	25	6
	45	4
	65	1
\$250k	25	2
	45	2
	65	0

TABLE 3  
URINE TESTING

Face Amount	Issue Age	# of Companies
\$50k	25	12
	45	15
	65	32
\$100k	25	51
	45	53
	65	55
\$250k	25	61
	45	61
	65	60

Nonmedical versus paramedical means there is an increase in usage of paramedicals with increasing age and face amount, and that is what we would expect.

The six most widely used criteria fall into two categories: personal history and lifestyle characteristics. Of the personal history, diabetes, heart disease, cancer, and elevated cholesterol are the most widely used. Alcohol and illegal drug abuse are the most widely used lifestyle characteristics. This is a change from the last survey, where driving and DUI were the most widely used.

Let's take a look at the personal history criteria in general. Companies are using all of these criteria more frequently than they were in the last survey, or more companies are using them. As you can see, the percentages are fairly high, so that means most companies are using most of these. We asked the question, if someone fails to meet that criteria, would they always be precluded from the preferred class?

The results showed that only the top two, diabetes and heart disease, would almost always preclude someone from the preferred class.

It's interesting to note that all of these percentages are down from the last survey, meaning companies are using different ways to judge, other than just relying on these criteria. One that's of note is the high cholesterol, which had 76% of the companies in the last survey precluding them, and only 37% were precluded this time. Only heart disease is widely used in terms of family history.

The results here are fairly similar to the last survey. In terms of precluding, for some reason, the stroke is up slightly, while all the others are down. With the lifestyle characteristics, as I mentioned before, driving and DUI are down, and all the other lifestyle characteristics are fairly widely used. Again, in terms of precluding, those percentages are all down from the last survey.

Now let's take a look specifically at cholesterol in Table 4. The distribution, compared to the last survey, is very similar. The average is slightly higher than the last time, but I think that might be because we had a couple companies that said that they used 400 as a guideline. I don't know what that means. There were two separate companies that did it. Anyway, in terms of the distribution, there were actually three readings that were fairly widely used.

Eight companies used exact readings or 220; 11 used 240; and 250 was used by eight companies. Cholesterol to HDL ratio, again, showed very similar results to the last survey. Again, there were three very widely used amounts. Nine companies used exact 5.0, nine used 5.5, and 14 used 6.0. We asked if companies varied their criteria significantly by these items, and we got these results. Those that varied smoking status typically varied it by build, blood pressure, and cholesterol. Those that varied the criteria by sex used height and weight as a variance. Those that did rating class also used build, blood pressure, and cholesterol as the differences.

Since we surveyed just ten-year term products, we asked companies whether or not they had these other products, and if they did, did they use it for preferred. What we found here, are actual numbers of companies. The percentage of companies using preferred on these other products ranged from just over 50% to just over 75%. I think there is an increasing trend toward using preferred for products in addition to term. As I mentioned before, we asked why they were not precluding insureds from making the preferred class. The overwhelming response was that the overall risk, rather than the individual criteria is assessed. There are more reasons. We asked if any other preferred criteria was used that we may have missed, and the biggest response that we got was, if it's ratable for any reason, then they can't

qualify for preferred. Some of the other reasons were normal treadmill, income level and occupation, and no chronic disease or illness.

TABLE 4  
CHOLESTEROL—AGE 45

	# of Respondents (42)
200-219	1
220-239	14
240-299	22
300-350	2
351-400	3
Low	200
High	400(2)
Average	254

There is something that I'm sure is of interest to everyone. This is new to this survey. We asked about not-taken rates, and we had ten companies that were able to breakdown their not-taken rates by class, and those are the ones that we're looking at. Of those ten, for a preferred nonsmoker, the results ranged from 1% to 9%, with an average of 4%. For the standard smoker class, they ranged from 6% to 35%, with an average of 16%. In terms of the order of magnitude, preferred nonsmoker had the lowest not-taken rates, followed by preferred smoker, then standard nonsmoker, and standard smoker.

**From the Floor:** Is this by policy?

**Mr. Klein:** This was by policy. What I wanted to do was finish up here and tell you a little bit about what the task force is doing in the way of a mortality study, and if you'll note, I just said mortality study rather than preferred mortality study. What we're planning to do is try to take a look at collecting all the underwriting criteria that's used in making the preferred decision, and that's also available electronically. We capture that for all insureds. We have a medical information bureau (MIB), who is working with us, in terms of collecting the data. We also have three pilot companies who agreed to work on this with us. Between those groups and a few people from the task force, we formed a subcommittee. The subcommittee has met a few times, is going to meet again in a couple weeks, and is going to finalize what data it is that we're going to exactly collect.

What I'm hoping to do is have information as of January 1, 1998 issues, but I don't expect to be able to collect from companies until late 1998 or 1999, due to the resource constraints that the year 2000 problem is causing that everyone's going through. One of my goals is to make the contributing as easy as possible for the companies, try to look at some of the new technology that's out there, and see if we can do that to encourage more contribution.

Another thing that I hope to be able to do is to provide each of the contributing companies the raw data back; obviously it's not identifiable company by company, but maybe it is in order to do further analysis and help set preferred criteria a little bit better. The original intent of the mortality study was for pricing purposes, but I do believe that it can be used for evaluation purposes as well once we get enough data. I think there's a need out there for that, as many of you know.

**Mr. David G. W. Bragg:** Next year, Bragg Associates will celebrate its 20th year in business. Our primary business activity over that period of time has been collecting mortality experience from companies and producing sort of specialized reports. I want to talk specifically about our two newest existing publications, *1997 Bragg Life Tables*, and *Bragg's Study of Mortality by Policy Size Groups*. Our next project will be a revisiting of the question of preferred and standard tables. We did a report in 1992 that was based on data from approximately 1970 through 1991, with most of the data concentrated at the end. We have approximately five years of additional data since that time, so we'll be sending out specifications during the early part of 1998. If you're not used to hearing from us and would like to get this kind of information, please contact me.

*1997 Bragg Life Tables* was constructed based on policies issued from 1990 to 1994. Data was collected from 23 companies. There was approximately \$4.4 trillion of exposure and about 83,000 deaths. There is a section of transformation factors in the report that help people make comparisons. But overall, the data block, relative to *1991 Bragg*, was showing 93.4% relative mortality, seemingly justifying revision of the rates. In specific segments, there's quite a bit of difference. Smokers are noticeably up and nonsmokers are down. Incidentally, we have almost as much female nonsmoker data in this table as we used to construct the 1991 tables, so we are getting significant amounts of data, and smoker/nonsmoker, and especially in later durations, and even in the ultimate block of data. Early on in our endeavor to do this, we were fortunate to come across a few familiar companies who really had some mature data and had been in the smoker/non-smoker business for some time. There were also unfamiliar names and companies I wasn't particularly familiar with, but they had a lot of data. There were also companies that had asked a smoking question early on in their development, but they were not

offering a premium differential, which is interesting. These companies had very mature data.

When we did the 1991 tables, we were looking at 1985–89 exposures, and we did not have a whole lot of ultimate data. We're more satisfied with this block and have more confidence in results that we're showing. We were able to collect a significant amount of nonsmoker differentiated, extreme high age information by attained age, and we would use this as a benchmark when comparing a lot of these rates, especially at high ages. Many people are interested in the subject. We've done our very best to describe the process in the report, and there has been substantial improvement in that segment.

Now I'll discuss our data contributors. We take data any way we can get it. We get an array of submissions that make us dizzy. We have a set of standard instructions that we send out, and we collect data by issue-age groupings and durational groupings. We also get it in substantial detail, but the bottom line is, we'll take whatever we can get. We have a method of making age nearest birthday (ANB) and age last data comparable by adjusting exposures. We try to keep it simple. What we do is not particularly sophisticated from a technological standpoint; we just collect as much information as we can and try to draw some conclusions and then bring this information to the marketplace as rapidly as possible. Just for our comparison, *1997 Bragg* is based on \$6.5 billion in actual death, benefits, compared to the 1980 Commissioners Standard Ordinary and the 1975–80 basic, which are based on \$4.8 billion and \$2.7 billion in deaths, benefits respectively. The average size policy has increased dramatically in recent years, so we don't have a large volume of data. We estimate that there are about 83,000 deaths. I am trying to give you a sense of the size of the data block.

Changes in mortality rates have been substantially proven, in some specific segments. For example, smokers have worsened significantly, and females are even worse than males. We have substantially more female smoker data than we've had in the past; also, the notion that females are inherently better than males probably should be put to rest, as smoking has an enormous effect on female mortality. I hear from all different sources, such as pension people, that mid-life female mortality is worsening. The overall change in the *1997 Tables* is about 6.5%, but the segments, once again, are interesting. There is improved nonsmoker mortality at early durations, and poor female mortality.

Improvements in older-age mortality have been really dramatic. I have various opinions. I believe that this class of aging senior citizens may be relatively unique among my generation and maybe that improvement won't be there, but again, this

is just an opinion. There is a significant class of people who are particularly interested in living as long as possible these days, which is great.

Rather than provide a lengthy section on comparisons with other mortality tables, we use the 1975–80 basic as a benchmark and management is used to seeing results relative to that table, so we continue to provide what we can. We're trying our best to get people to start looking at an actual smoker/nonsmoker table constructed from first facts, but we continue to provide information relative to the 1975–80 basic. I also have a section of comparisons relative to the new Canadian Institute of Actuaries (CIA) 1988–92 results. Smokers remain a significant market segment. It was declining for a great many years, but seems to have leveled off at around 15%. I'm sure there is a hardened core block of smokers that will continue and may even be highly profitable! I don't know.

Relative mortality is a subject that a great many people are interested in. There are heavy and light smokers. There are pipe and tobacco users. There is also a broad spectrum of nonsmokers, such as those who have quit for less than one year. There is a great deal of published information on relationships between heavy and light smokers. We know a great deal about nonsmoker categories. We believe there's a substantial portion of quitters in our nonsmoker block, as quitting definitions have become more stringent over time. We know that we have a lingering and aging block of nonsmokers who were quitters of one sort or another, so there is residual mortality there. If you look at two individuals by attained age, a smoker relative to a nonsmoker, there's a substantial difference in the mortality ratio. If you look at the same smoker and nonsmoker, at the same attained age, in the ultimate category, the ratios of smoker to nonsmoker are narrower, and we believe this residual quitting has some effect on it.

I want to move on to the publication of the study of mortality by policy size group. We were able to convince a substantial group of companies to contribute experience, broken out in size groups. To give you an idea, the size of the data block is about \$1.2 trillion of exposures and actual deaths total a little over \$2 billion. This study was constructed from a subset of the data used to construct the *1997 Life Tables*, and it is a pure data study. It's exposures and actual deaths by issue age groups and durational groups are in nine size bands, and in male/female, smoker/nonsmoker, and totals combined. It's a thick report, and it's all on disk. It's an attempt to provide specific information at market segments.

Let's discuss the overall summaries. These again are relative to *1991 Bragg*. This report was finished prior to the publication of the 1997 report, but it is a relatively simple matter to convert these. These overall ratios are very interesting; they're exact and they're accrued exactly as reported. They decline nicely, as you might

expect, until you get to the million-dollar size band, and then they increase. There's a section of underwriting requirements by size band. It's included in the report. Once again, the report itself is really a data study. We tried to run up as much information on underwriting, and I'd be happy to let you take a closer look at this in some detail if you're specifically interested.

Finally, our next report is going to be on preferred and nonpreferred. This is our most recent data block. We have produced an exhibit on an entire block from 1989 to 1994, by preferred, again, relative to *1991 Bragg*. There are about a half a trillion in exposures. This data block is running about 63% of *1991 Bragg*.

We have two additional years of data that haven't been included in this. This is the most recent thing. When we send out the specifications, you'll be given as much information as possible at the time, but we know the subject is of considerable interest. We have a lot of data. The original report had a set of model underwriting rules that were designed to characterize the nature of the mortality contained in the eight tables (male/female, smoker/nonsmoker, and preferred and nonpreferred). If you change the rules, what effect does that have on overall mortality and those that are qualified? We'll bring as much information to bear on those kinds of questions when we bring this report to the marketplace.

The standard block is just slightly over 100%. Once again, we'll be using substantially more data that we have in hand. I encourage people to contribute data, and many people are telling me it's possible that some companies actually dedicate time and resources to cull out information specifically for us in the format that's most useful and easiest for us. We'll take it that way. We'll also take it, once again, any way we can get it. I have a set of instructions, if you're interested in receiving them. It's our ability to collect data over the years that has made all this possible. Once again, if you're interested in contributing data, I'd be happy to talk to you about it.

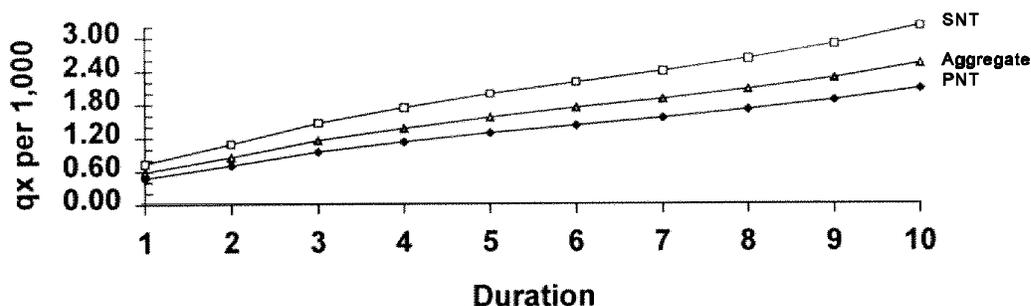
**Ms. Mary J. Bahna-Nolan:** David and Al did a very good job giving an overview of what's happening to mortality from an industry perspective. What I'd like to do is take a look, from a company perspective, at the role that agent selection has had on mortality. There is a need to account for it when setting expected mortality levels.

I'd like to start by taking a look at a simpler time, about two to three years ago, when most companies had only one preferred class for the nontobacco risks. The preferred classes then were fairly homogenous between the companies. By that, I mean that most were designed to qualify about 50–60% of the applicants into the preferred class.

Companies often set their expected preferred mortality levels by taking their overall mortality experience, and then reclassifying their risks into preferred and standard, based on their proposed preferred program. They'd carve out the resulting mortality for the preferred risks. Then companies used a balancing formula to solve for the residual standard nontobacco mortality, and it's a simple algebraic formula, where  $QP$  equals the percentage expected to qualify into the preferred risk class. This is on an applied-for basis. You equate back to the whole.

If a company had an overall nontobacco mortality of 50% of the 1975–80 basic age nearest birthday tables, and they have a new preferred risk class that's designed to qualify about 60% of the applicants, based on carving out the preferred mortality, they ended up with about 41% of the 1975–80 tables for the preferred mortality. This assumes that the company hasn't made any additional changes to the underwriting practices. Using the balancing formula to solve for the residual standard mortality, they end up with a standard mortality of about 63.5% of the 1975–80 tables. Chart 1 shows you how the preferred and standard mortality relates to the aggregate mortality, which is in the middle. It's for a male, issue age 45, no tobacco risk.

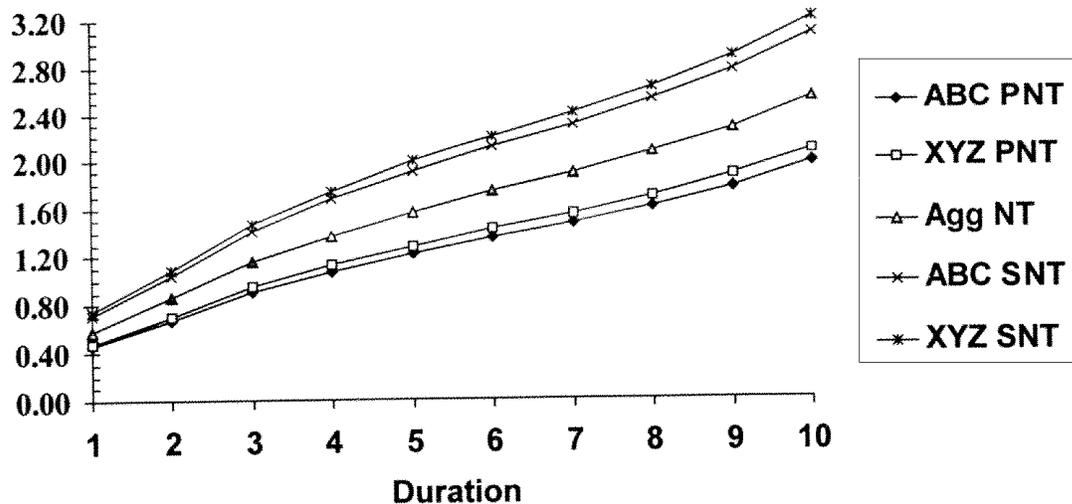
CHART 1  
MORTALITY FOR MALE, ISSUE AGE 45, NO TOBACCO



But is there a flaw in the balancing formula? What happens when you introduce agent selection into the picture? Take two companies with similar but not identical criteria for the preferred risk class, ABC Life and XYZ Life. ABC Life has a slightly tighter preferred program that is designed to qualify about 50% of the applicants. XYZ Life's program is a little bit more liberal and it is designed to qualify about 60% of the applicants. If both ABC Life and XYZ Life follow the logic previously described to set their mortality, and if they both had identical aggregate mortality experience to start with, ABC Life, with a tighter preferred program, would expect lower mortality. Chart 2 just shows the resulting mortality for each company.

Chart 2 shows the relationship to the aggregate nontobacco mortality. If all other pricing inputs were equal, such as persistency, expenses, profit objectives, and commissions, the premiums for ABC Life should be less. Some sample premium rates for a ten-year level premium product, \$1 million dollar policy are: \$1,670 and \$1,710. The premium for ABC Life is about \$40 less than that for XYZ Life.

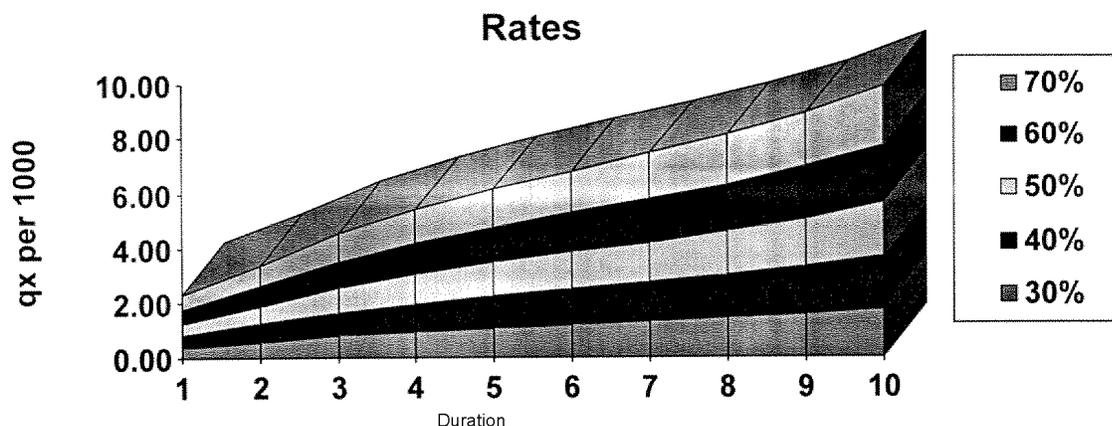
CHART 2  
PREFERRED MNT MORTALITY, ISSUE AGE 45



In today's competitive environment, especially the term and the low-cost universal life (UL) markets, the agent is going to sell a product with the lowest premium and the highest commission. Since the commission rates are equal for these two companies, they're going to sell ABC Life's product with the lower premium.

So how does that impact mortality? Let's take a look at the mortality assumptions, or what could be exhibited without agent selection for various qualification rates (Chart 3). ABC Life, which has a program designed to qualify about 50%, would expect mortality that's represented under the area of the yellow graph. XYZ Life, with their 60% qualification, would expect the mortality represented by the area underneath the dark blue graph. ABC Life's mortality is really made up of risks that would qualify under a 30% qualification, a 40% qualification, and their 50%. Likewise, XYZ assumes that they're getting risks that would also qualify in the 30%, 40%, and 50% range.

CHART 3  
MORTALITY EXHIBITED FOR VARIOUS PREFERRED QUANTIFICATION RATES



70% is green, 60% is dark blue, 50% is yellow, 40% is red, and 30% is light blue.

Because we have agent selection, ABC Life is getting more of the healthy preferred risks in the preferred risk class. If we go back to the chart, they're getting the risks that fall under that 30–40% qualification rate. XYZ, on the other hand, is not getting most of those super-healthy preferreds. Instead, they get more of what we call the borderline preferreds, or those that don't qualify into ABC Life's preferred program, but do qualify into XYZ Life's preferred program. What happens is that this ends up skewing the mortality upwards for XYZ Life.

Let's say ABC Life actually issued about 80% of the policies in the preferred category, and I know that sounds like a very large number in relation to what they were originally expecting, which was 50%. In reality, that result is quite common. Companies that were new to the preferred market a few years ago got pretty nervous when they started seeing these results. Many of them started to interpret the results as either they were making too many underwriting concessions, or their underwriting was too liberal, or the preferred guidelines needed to be tightened, and that they had really underestimated the qualification percentages for the preferred. However, after further study, they found that the result was often due to agent selection. So if we go back to ABC Life, with 80% of their policies in the preferred category, we know that the preferred risks are priced with the correct mortality because they are getting some of those super-healthy preferreds, those at the lower end of that curve on Chart 3. But the residual standard risks are not priced appropriately. Remember, the balancing formula that we used assumed that all the borderline preferreds would be issued into the standard class. As we saw, due to the agent selection, many of those will go under XYZ's program.

Table 5 shows the actual versus expected mortality for ABC Life. You can see the male preferred non tobacco mortality (MPNT) comes in right around where it was expected. The male standard nontobacco mortality (MSNT), however, is higher than the original 61%. But the aggregate mortality has been reduced significantly. That's because they are now getting 80% of their risks in the preferred nontobacco category, versus the 50% originally anticipated.

TABLE 5  
MORTALITY AS PERCENTAGE OF 1975-80 ANB TABLE

Risk Class	Actual	Expected
MPNT	39.0%	39.0%
MSNT	63.5	61.0
Aggregate	43.9	50.0

What about for XYZ Life? XYZ no longer gets the better preferred risks that also qualify for ABC Life's preferred program. They also get more of those borderline preferred risks that don't qualify for ABC Life's preferred program.

Now, if XYZ Life actually issued 80% of the policies in the preferred category, the preferred risks are priced with aggressive mortality. The balancing formula assumes that those healthy preferred risks will stay in the preferred risk class, and as we know, they're going to ABC Life. So the resulting mortality for XYZ Life is shown in Table 6, where its preferred is actually coming in at 45% versus an original expected 41%. The standard nontobacco is coming in around where it was expected, and the aggregate, although it has reduced, has not reduced as greatly as it did for ABC Life. Table 7 shows the relationship of the two companies and their mortality. A reality for ABC Life is that the resulting standard mortality would probably be somewhere between the 61% originally expected and the 63.5%. Some of the healthier standard lives will qualify under another company's preferred program, but not all will go. As for XYZ Life, the resulting preferred mortality will be somewhere between 41% and 45%.

Again, some of the healthier preferred lives that do qualify under another company's preferred program will stay and still be issued. Like ABC Life, their standard mortality will be greater than the 63.5%, because again, due to agent selection, some of the healthier standard lives will still qualify under another company's more liberal preferred program.

TABLE 6  
MORTALITY AS A PERCENTAGE OF 1975-80 ANB TABLE

Risk Class	Actual	Expected
MPNT	45.0%	41.0%
MSNT	63.5	63.5
Aggregate	48.7	50.0

TABLE 7  
RESULTING  $Q_x$  AS A PERCENTAGE OF THE 75-80 ANB TABLE

	ABC Life	XYZ Life
Preferred	39.0%	45.0%
Standard	63.5	63.5
Aggregate	43.9	48.7

For XYZ Life, we saw that the aggregate mortality, while it reduced, didn't reduce greatly. Whether or not their overall mortality will improve will depend on the number of healthier preferred risks that are lost due to the agent selection, the preferreds that end up in the preferred risk class, and the general mortality improvements, which could override other factors. Two to three years ago, because many companies had similar preferred programs, the flaw in the balancing formula was not very detectable, and general mortality improvements overrode any understatements in mortality.

What about today? Today, we're seeing overall mortality improvements, and based on some preliminary results from the preferred underwriting survey that Al discussed earlier, an aggregate nontobacco mortality of about 40% of the 1975-80 Aggregate ANB Table is not uncommon. These improvements were due to general underwriting or mortality improvements and better underwriting. We're also seeing many companies offer more than the two nontobacco or nonsmoker risk classes. nontobacco or nonsmoker risk classes are quite common, and some companies offer as many as six. But as the number of preferred classes increases, the influence of agent selection on mortality grows.

Again, this is best illustrated by example. We have two companies, Company A and Company B. Company A has three nontobacco classes, a super preferred, a preferred, and a standard. Company B has just the two nontobacco risk classes, the preferred and standard. Both companies expect about 60% of the applicants to qualify for a preferred class, with Company A expecting about half of those to qualify into their best class or their super preferred class. If neither company has a credible mortality study by risk class, they use the balancing formula to set mortality.

But by using this balancing formula and ignoring agent selection, the resulting mortality or expected mortality will look like it does in Table 8. The resulting premiums, again, with all other pricing inputs being equal, for a ten-year level premium, \$1 million dollar policy is: Company A super preferred nontobacco (SPNT), \$1370; Company A preferred nontobacco (PNT), \$1,580; and Company B (PNT), \$1,500. You can see that the difference between Company A's best rate and its second rate is about \$210, which is quite significant. The difference between Company B's best rate and Company A's best rate is \$130, which is a significant amount, in total dollars, from an insured's perspective. The difference between Company B's preferred rate and Company A's second, or preferred rate, is \$80.

TABLE 8  
RESULTING MORTALITY

Class	Company A		Company B	
	Percent Qualifying	qx as % of 75-80	Percent Qualifying	qx as % of 75-80
SPNT	30%	26%	0%	N/A
PNT	30	38	60	32%
SNT	40	52	40	52
Agg NT	N/A	40	N/A	40

Due to agent selection, you can see the actual percentage of issue and paid cases in each class for each company as shown in Table 9. Again, because the premium differential is fairly great between the best risk class for Company A and Company B, those healthier preferreds that qualify into Company A's super preferred will go there, and they end up getting about 50% of the applicants or 50% of the insureds in that class. In the preferred nontobacco class for Company A, an applicant that does not qualify for the best rate has a choice between Company A's and Company B's preferred rate.

TABLE 9  
ACTUAL/EXPECTED PERCENTAGE OF ISSUED AND PAID CLASSES IN EACH CLASS

	Company A		Company B	
	Expected	Actual	Expected	Actual
SPNT	30%	50%	0%	0%
PNT	30	20	80	70
SNT	40	30	40	30

Remember, they both had the same overall preferred qualification, so they will qualify under either program. Again, due to agent selection, because the premium

is \$80 less for Company B, the agent will direct the insured or applicant there. The same thing holds true for the standard nontobacco class, where risks may qualify under a company's more liberal preferred class.

So what happens to mortality? The super preferred, nontobacco class is priced appropriately for Company A. Remember, they're getting all of the healthy preferred risks. Their preferred nontobacco and standard nontobacco understates the mortality and ignores agent selection. Table 10 shows actual versus expected mortality. What's frightening about this is that although the aggregate mortality did reduce slightly (because the company is now getting half of their risks in the super preferred class versus the 30 it originally expected), half of their business, 50%, is mispriced and understates the mortality. For Company B, the preferred nontobacco expected mortality assumed the health preferreds would still apply. Remember the significant premium differential between the best risk classes of Company A and Company B. So most super preferred risks don't even apply. Company B's preferred nontobacco mortality is actually worse. Table 11 shows the actual versus expected, and you can see that actual is higher than expected in each category.

TABLE 10  
ACTUAL TO EXPECTED MORTALITY—COMPANY A

	Actual	Expected
SPNT	26%	26%
PNT	41	38
SNT	56	52
Aggregate	38	40

TABLE 11  
ACTUAL TO EXPECTED MORTALITY—COMPANY B

	Actual	Expected
PNT	36%	32%
SNT	53	52
Aggregate	41	40

So what does this tell us? There is a flaw in the balancing formula, and it ignores agent selection. If your company uses the balancing formula to set mortality, it's important that you understand this. Companies without a super preferred risk class may be underestimating the added mortality due to agent selection. I think a market exists for the residual nonpreferred risk class. So how can you preserve mortality when there's agent selection? Perform mortality studies on all your risk classes. Unfortunately, for many companies, these are not always credible. Carefully study the preferred guidelines and competitive position of your peer

competitors. If an agent calls and is talking about one person who received preferred from one company, understand the difference, and be sure that you're comparing apples to apples. Carefully study the placement rates by risk class. If the distribution is different from expected, with no underwriting concessions being made, you have agent selection. Add additional preferred risk classes to protect mortality. Now, I'm not saying every company should go and add super preferred, and have six nontobacco risk classes. It is not a solution by itself. Companies must be able to underwrite to the risk level, and be able not to make the exceptions as they add more stratifications. If adding or changing the preferred criteria, without a credible mortality study, you must factor agent selection in when setting the residual mortality assumption.

**Mr. Jay D. Biehl:** I gave an expanded version of this speech at the Institute of Home Office Underwriters. One point that I tried to stress was the communication that has to take place between actuaries and underwriters. In fact, at the end of the session, one of the underwriters asked me, "How do I get the actuaries to talk to me?" I suggested buying them lunch is always a good idea. The point is, at many organizations, there's not that much communication that takes place between the actuaries and the underwriters, and it's very important that both sides understand what the other side's trying to do in order to make the company move in the direction that is intended. Now, what I want to talk about really builds upon some of the things that Mary talked about, and that is, what happens when you allow exceptions into your preferred underwriting pool?

You know, we used to have a situation in which people were shopping for standard cases, trying to get those borderline substandard cases into a standard pool. Today, we've taken that to an extreme. In the old days, everybody kind of understood exactly where the company's standard and where their substandard was. But the farther you went out into the substandard range, the more subjectivity came into play in the underwriter's mind, especially if you had multiple impairments. Just how substandard is this individual? When we went to preferred underwriting, I think the thought process was, we're going to make this much more objective. We're going to take that subjectivity out of the underwriting process. My cholesterol's 240 or it's not. I weigh 200 pounds or I don't. My blood pressure is 140 over 90, or it's not. Those are very objective criteria, so the underwriting process has had to get easier, right? Well, it hasn't gotten any easier; it has gotten tougher. In the old days, it was standard and substandard; roughly 90% of the group was standard, about 5% was substandard, and about 5% was declined.

So how many borderline cases did an underwriter really have to worry about and think about in moving cases? Then you had some who were on the edge of or just barely standard, but underwriters really had to make a decision about whether that

individual was standard or not. What do we have today? We have multiple preferred classes, and we have some of the best preferred classes that have 20% or 25% qualifying. You have a lot of cases that either aren't in those preferred classes, or are right on the edge of those preferred classes. The underwriter is being forced to make many more decisions today than they ever have in the past.

Now, what are the cases that underwriters are thinking of making exceptions for? Those cases are generally that a person doesn't quite qualify, based on certain criteria. However, if you look at all these other criteria, they're significantly below our cut points for those criteria. Can I let that person into the group? And the concept that I tried to get across to the underwriters is one that I think is very difficult for them. I told them, you cannot think about that individual, in making an exception, and they gave me a very funny look. I told them that they have to think about what we try to do.

What do we try to do? We try to put people in groups that have similar risk characteristics. We don't do it exactly on an individual-by-individual basis. I don't care how good of an underwriter you are, you can't tell me which ten people out of a group are going to die in the next five years. The best you can do is tell me that there's going to be ten deaths in that group over the next five years. So when you're thinking about making an exception to a preferred class, don't think about the individual, think about what have I done to the group? What has happened to the risk profile of my preferred group? Have I made it worse, have I made it better, or has it remained about the same? You can't think about the individual, you have to think about the group. It's a concept that I repeated 20 times that day, and I'll probably repeat it three or four times today as well. What happens to the group?

I start with the standard, normal bell curve and go back to the standard/ substandard description. In the your standard group, some are a little better, some a little worse. Mortality was 100% of your pricing expectation. Now we think about the days where we went to preferred and residual, and it's easy to have the mindset that this is how we have divided the standard pool. I just happen to have divided it into 50% for the preferred and 50% for the residual standard. We draw on a straight line through the middle of the bell curve. Those on the left are preferred, those on the right are not, but that's really a little too simple. Think about how many things we have going on in a preferred underwriting process. Many have different variables; there is a lot of correlation and a lot of different things going on.

The standard group is on the left side of the curve and they are preferred and those on the right are the residuals. They have mortality for those with the preferred expected mortality. So the question you have as an underwriter would be, I've got these individuals who are not preferred, and they do not meet the preferred

guidelines. Shouldn't I let them into the group? Shouldn't I allow them to be preferred? I told that group, "I'm not an underwriter. I've never underwritten a case in my life. If I was an underwriter, I think the mentality that I would have would be, that I have two different risks, and I'm going to think about those people who came into my group who are trying to become preferred. I'm going to think of the worst individual whom I have legitimately allowed into the preferred pool. If this individual is better than the worst individual whom I have legitimately let into the pool, surely I can let this individual into the pool." Does that make sense? No, it doesn't. What happens if you allow individuals that are more to the right of the line than are to the left of the line? You have worsened the mortality for the group.

I'll say it again. You can't think about the individual; you have to think about what you have done to the group. By allowing individuals to the right of the line into the group, I have made the mortality worse for the group in total, even though those individuals may have better expected mortality than some that legitimately get into the group.

There are two different sets of preferred criteria that I can define that have the same exact mortality. The thought process you have, and the thought process the underwriters have is they can then take individuals that meet one of either of those criteria into my preferred plan, and still have the same expected mortality. And the answer is no, because now you don't have a pure group. The lines do not cross. Because you will take individuals who meet one of either two criteria, you do not have a pure group A and you do not have a pure group B. You have a hybrid of those two groups, and the mortality has moved. The expected mortality has shifted to the right. What have you done to the group in total?

Now to analyze the expected impact of the exceptions, I'm going to utilize the Lincoln Mortality System (LMS). It is an internally designed system that quantifies mortality expectation for a given set of preferred criteria.

Built into that system, we consider the impact of mortality or such things as diastolic and systolic blood pressure, cholesterol, the cholesterol ratio, build, those treated for hypertension, those treated for high cholesterol, hazardous sports and avocations, motor vehicle records, aviation, personal history, family history, and the time since last smoked. Also, we consider the issue that Mary talked about, which is the open-market impact. What is the resulting movement within the preferred classes and the residual classes?

Now, I'm not going to fire up the LMS, due to time constraints, but what I'm going to do is show you some summary results of runs that were previously made. In these runs that I've made, I've assumed that one thing is better than the criteria, and

one thing is worse than the criteria. There is a trade-off kind of concept that we think is fine. Here's my first case. I want to highlight the build and the cholesterol ratio. In this particular case, the criteria is for a six-foot male; 200 pounds is the limit, as is the cholesterol ratio of 5.5. We have an applicant who weighs 220, and the cholesterol ratio is 5.0. The underwriters ask, can I make the exception? He is a little bit over on the weight, but a little bit better on the cholesterol ratio, can I make an exception? If you had two programs, where all the other criteria was exactly the same between program one and program two, and in one program, the limit on the build was six-foot, 200 pounds with a cholesterol ratio of 5.5, and in the second program, the limit was 220 with a cholesterol ratio of 5.0, you would have mortality expectations that are essentially identical. Mortality is essentially identical; there is an 0.5% difference at 35, zero at 45, and a 0.3% difference at 55. So you go back to talk to the underwriter; these two are exactly the same. I can allow in one of either two criteria. But what happens? You've constructed this again. You've constructed the curve to the right, the resulting mortality is going to be higher than if I had a pure group one or a pure group two.

In Table 12 a couple of things are going on. I've constructed a program where I left the cholesterol ratio at 5.5, and I moved the build from 200 pounds to 220. That is a no-brainer to everybody. If I said, I'm going to keep every single preferred criteria exactly the same place it was, and I'm going to liberalize one of the criteria, what happens to mortality? It goes up. That's pretty easy to figure out. The left side shows how much it goes up by just allowing the build to go from 200 to 220. It ranges from 1.5% to 2.8%, in those respective ages. The thought process was that I have two programs that have the same mortality. But what has actually happened by drawing that far-right curve? Mortality has gone up to range from 1.4% to 2.7%, by defining a new group of individuals. If they can't meet preferred criteria one, but you do meet preferred criteria two, you're in the group.

TABLE 12  
CASE #1

Age	Higher Mortality with prior build	Higher Mortality with exception
35	1.5%	1.4%
45	2.3	1.8
55	2.8	2.7

Preferred criteria:

Build—Male, 6'0", 200 lbs. Cholesterol ratio = 5.5

Applicant:

Build—Male, 6'0", 220 lbs. Cholesterol ratio = 5.0

Now, you'd have 0.2% difference at 35 and the 0.5% difference at 55. What happens? Again, to the left, those numbers represent just allowing the cholesterol limit to move from 230 to 260 without changing any of the other preferred criteria. Again, that's not a surprise. Mortality goes up when you loosen one criteria, and it goes up 0.8% to 2.4%. Even the magnitude and the direction, I don't think, comes as much of a surprise, that you're going to have more of an impact at an older age with criteria with the cholesterol movement, as demonstrated there. But what happens when I tried to do the trade-off and I constructed a hybrid group? My hybrid group movement is 0.8–2.2%.

I posed the question, what if an applicant with an elevated value for one criteria meets a more stringent standard for one or more other criteria? And the answer is, the credits may, but they may not, offset the debits from the negative criteria. You can certainly find individuals that are exceptions, but they have characteristics or a risk profile that matches the expected mortality for the group. You can also find individuals that you think are on a borderline, or that you think are better than some of the worst risks that you've allowed into the preferred criteria, but you really can't allow those individuals into the preferred pool.

Now, I think that's probably a little different than what you might have expected me to tell you. You might have expected me to tell you, yes, you can construct two different preferred criteria, and they can have the same mortality, and you'll be fine. So, what's the good news? Part of the good news is, exceptions are part of reality. They happen. They happen in every company. If you don't think they happen, I urge you to talk more to your underwriters. I'll agree that they don't happen at some companies. They're making very good decisions about those exceptions, and they're holding the line. But many companies are making exceptions 5%, 10%, 15%, or even 20% of the time. It kind of blows your mind to know how many exceptions there are in the preferred group, but it's happening. So I urge you to talk to your underwriters to see how many exceptions are going on.

Because exceptions are part of reality, they're part of the emerging experience. If you utilize your mortality experience to set your mortality assumption going forward, there's an underlying level of exceptions that have happened in that base. So, the question then becomes, what has happened to the exceptions over time? Are there more of them, fewer of them, or the same type? What's going on with them over time? I think there's more pressure all the time for exceptions. If you talk to underwriters, that's what they'll tell you. There's more pressure now to make exceptions today than there was two or three or five years ago. Regardless, though, you have to understand the type, the frequency, and the cost of exceptions. This has to be a very touchy subject with the underwriters. It's almost like a finger-pointing exercise, but it's not. You're not necessarily telling the underwriters they

shouldn't make exceptions. What you're telling them is you have to understand the exceptions that you're making, and you must make sure that those make sense. It's almost like, now, they may even understand the type of exceptions they're making. They might have a fair understanding of the frequency, but it's a good bet they don't have an understanding of the cost. It's like going out and finding a car that you really like, having pressure from your spouse to buy that car, but having no idea how much it costs. You drive it off the lot, and two weeks later money starts disappearing out of your paycheck. You don't know how much is going to disappear, and you don't know for how long it's going to disappear, but you sure like that car. Now, if you knew how much it was going to cost, you might not have liked that car. That's really the key here; you have to understand what the cost of those exceptions are and decide if they make sense.

In summary, companies are under pressure to make exceptions to the preferred guidelines. The cost of those exceptions can be serious. When I spoke to the underwriters, I put up a slide that said, "So what?" after I had 2%, 3%, and 4% differences in mortality. I could tell that even if there were a 4% or 5% difference in mortality, the underwriters would say, "What's that?" Do you know what a 5% difference in mortality is? A 5% difference in mortality, for a competitive term product, can be half of your profit. It's a big deal. Five percent is a very big deal.

There are places where exceptions make sense. To those individuals sitting on the line, close to your expected level of mortality, it makes sense to make those exceptions. You have to understand what makes sense, and what doesn't make sense. You have to understand the integrity of the original mortality assumption. This goes beyond exceptions into preferred. You have to understand, whenever you're using mortality from your experience, and you're using that going forward, you have to understand what's in it. What are the distributions of the smokers and nonsmokers? What's the underwriting criteria that was in place on the experience? How do I move that exposure and experience from what has happened in the past, forward, as I use it to set my mortality assumption going forward? How many exceptions are in there? How many exceptions can I expect going forward? So finally, maybe there are some cases where exceptions make sense, but again, I hope I've at least given you a framework to understand when those exceptions make sense, and how to understand the cost of those exceptions.

**Mr. Larry M. Lankowski:** Has any concern been given to the composition of the group of people falls into that preferred class? Should we consider by age? For instance, when we have a super-preferred class, do we have only females under age 35? Does that ratio become 80% of those people who are preferred, as opposed to, if we wanted 50% overall, we might be getting 50% overall, but out of our male

age 75 class, we're only getting 10% of those people are preferred. Do we do pricing that way? Has anybody looked at it that way?

**Mr. Biehl:** The percentage qualifying will vary significantly by underwriting class, in particular, for females versus males, in regards to blood pressure, cholesterol, cholesterol ratio, and build. There is a much higher prevalence rate of females that can qualify for those cut points than there are males. You certainly have to look at each class—females, males, nonsmokers and smokers—because the prevalence is going to be significantly different. As you're figuring out and trying to understand, where what qualifying percentage you want, you have to take all of those things into account because they will vary radically.

**Mr. James B. Keller:** David, one of the questions I have is in regards to your comparisons of the *1997 Tables* to 1991. I'm wondering how you vary for the distributional biases that could be in there. For instance, if there are more preferred in the 1997 distribution than the 1991, would that lower mortality? What if there are more super preferred or preferred buying larger amounts than residuals? All the different distributional biases can show mortality improvement that's really nonexistent in the underlying individual segments.

**Mr. Bragg:** What we're trying to do is provide you a benchmark from which to start. We'll do our best to characterize the data as we reported, but we think you have to start from somewhere, and really, you're much closer to the scene in the field than I am, Jim, on what effect these differences have. But I'm trying to provide you a snapshot of what mortality is preferred, as reported to us, and characterize those data as best as possible. Then you can change it as you see fit.

**Mr. Michael Palace:** We, too, are attempting to use a balancing formula to come up with standard mortality. I would be interested to know whether it's anecdotal or from studies. What kind of experience has actually emerged on standard mortality versus preferred? I'll share with you some inside information. We found that actually, in certain classes, our standard mortality is better than our preferred, so we felt there was a little bit of a problem with exposure. I would just be curious about whether you have any insights on that.

**Ms. Bahna-Nolan:** For the most part, the exposures have been too small, in the standard nontobacco class. One thing that has been really hard to figure out is the role that general mortality improvements have had. Oftentimes, those general mortality improvements have overridden any of the actual effects of the agent selection.

**Mr. Frederick S. Townsend, Jr.:** Mr. Klein, I wanted to ask for a clarification on the personal history criteria. The way I'm reading this, it says that if people have a cholesterol problem, 37% of the companies always exclude them from the preferred class, but if they're being treated for a cholesterol problem, 54% of the companies exclude them from the class. Similarly, for high blood pressure, if somebody has hypertension, 49% of the companies always exclude them from preferred class, but if they're being treated for high blood pressure, 60% exclude them. Is this correct? If so, why are people who are being treated for their problems more likely to be excluded than those who aren't being treated?

**Mr. Klein:** That's a good question. I think the way to read this is that these will always be precluded. Let's take the cholesterol, such as those that are treated and still have the high cholesterol, half the companies are going to exclude them. If they have high cholesterol and they're untreated, they will look at other things as well, and decide whether or not to preclude them.

**Mr. Townsend:** So does treatment for cholesterol mean they still have a cholesterol problem with treatment?

**Mr. Klein:** Yes.

**Ms. Bahna-Nolan:** One of the issues pertaining to the treatment for high blood pressure is there's also a chance that the person will stop taking that treatment, and then their blood pressure will become very elevated. Those that are untreated will probably be at a more stable point.

**From the Floor:** Many of the tables and charts had age 45 summaries on them. You indicated that the study will be out in early 1998. Is there a chance that there's some preliminary material that people could contact the Society about to get the other information on ages 55 or 65?

**Mr. Klein:** The other ages that we asked about were 25 and 65, so we have other ages. We're just in the process of preparing the data right now, and we're having our next meeting the end of next month, to try to put all this together. We may know a little bit more, but we haven't compiled it all just yet.

**From the Floor:** There was an article in a late winter or early spring issue of *The Actuary*, that talked about actual preferred mortality being exceptionally good for the first few durations, and then there was hockey-stick-type actual results after duration four or five. And I was wondering if anyone has, in looking at some statistics on preferred or super preferred, seen the impact of the preferred underwriting criteria wearing off much more rapidly than we might have

anticipated, with a 15-year select table. Al, some of your tables actually showed people looking at duration one and duration six on an expected basis. There wasn't anything really there that would seem to indicate that people are expecting a rapid deterioration in the selection criteria.

**Mr. Klein:** I had mentioned that we also asked about other durations. I do have information on durations one, three, six, and ten, although I have not had a chance to see if that has a different effect. I just looked at one and six. The mortality I have seen has been exceptional in the very early years. I don't have enough data yet to see that hockey-stick-effect that you're talking about, but I would tend to think that it's going to end up that way as well.

**Mr. Biehl:** I have one other comment to add to that. There's been such a change in the preferred marketplace, over the last several years, that what was the top preferred class a few years ago is no longer the top preferred class. You have individuals that have gotten into the fourth or fifth duration of those policies and can find much better rates, even though they're four or five years older. They also still qualify at the tighter preferred limits in the new policies, and they're migrating out of the group. While there may be a hockey-stick effect going on, over time, it's not a pure group that you're following, and you're losing the best risk to other preferred plans.