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CURRENT AND FUTURE UNDERWRITING ISSUES

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- o How can blood tests be used on a cost-effective basis to improve mortality results?
- o What does the future hold for genetic underwriting?
- o How are expert systems being used for underwriting?
- o What risk characteristics are most useful for preferred underwriting?
- o How is underwriting of morals affected by public policy?

MR. JOHN E. TILLER, JR.: John Nigh is with Tillinghast in Atlanta as a Consultant. Prior to joining Tillinghast, John had extensive background in the industry in a number of companies that worked with preferred underwriting programs and speciality underwriting programs (preferred risk, guaranteed issue, etc.). John, who has had a very extensive underwriting background for a modern actuary, will address the issues of blood testing and the possible improvement of mortality as well as the preferred risk underwriting programs.

Michael Rich is Vice President of Underwriting and Issue at John Hancock. Mr. Rich has been involved in underwriting issues for a number of years and will bring us up to date on some of the things that are happening today in the world of expert systems and underwriting and maybe give us a glimpse of the future.

Then we're going to leap even further into the future with Gregg Sadler. Mr. Sadler is with Business Men's Assurance Company where he is Senior Vice President. He is on the Board at the Home Office Reference Lab; as such he has been involved in risk appraisal and significant underwriting and testing issues for a number of years. Mr. Sadler will specifically address some items regarding public attitudes with respect to underwriting and the future for genetic underwriting which may be where we are all headed by the end of the century.

MR. JOHN O. NIGH: How can tests be used on a cost-effective basis to enhance the mortality result? First we'll review the most common tests, what they are for and see if they are cost justified. The most frequently discussed test today is the human immunodeficiency virus (HIV) antibody test. The cost is $8 to $9. The standard test protocol, which can include up to two positive enzyme-linked immunosorbent assay (Elisa) tests and a Western Blot test, is the test of choice today. As of January 1, 1989, the State of California will allow the standard test protocol for life insurance only. Up until that date, the T-Cell Ratio test was the test that was required in California.

For those companies that do order an HIV antibody test, a significant majority will also order a blood chemistry profile. Included in the blood chemistry profile are up to 16 clinical results. The most well-known include the following: glucose, a major indicator of diabetes; the various renal function tests; serum glutamic oxaloacetic transaminase (SGOT), and alanine aminotransferase (ALT) liver function tests; and the various cholesterol tests, including the total cholesterol to high-density lipoprotein (HDL). The typical cost for a blood chemistry profile is $13 to $14.

Then we have the urinalysis. Included in the standard urinalysis test will be tests for protein, blood, glucose, nicotine and prescription drugs. It is not terribly expensive -- $4 to $5. There are special tests that can be done of the urine including toxicology and cocaine. If the company is going to run a special test, typically the test of choice is going to be cocaine. I do not know if it is related, but at least one study has shown that applicants for insurance policies will test positive for cocaine ten times more than all legal drugs combined. However, it is a reasonably expensive test at $7 to $8. You have to have a test kit to collect blood and urine at a cost of roughly $3.

The Paramed Exam cost will be anywhere from $35 to $50. If you are going to have the test taken, the incremental cost for having other readings taken, such as blood pressure and electrocardiogram (EKG), is insignificant.

When we add this all up, we are now at roughly $70 to $90. The question is, "Are these costs justified by the resulting mortality savings?" Studies supported by the Cowell/Hoskins paper and our own internal AIDS primer, of which Mr. Tiller was a co-author, demonstrated that the extra mortality associated with applicants that test positive for the AIDS antibody will run roughly $500. Given incidence rates or prevalence rates in the general population of 1% to 2.5%, depending on the age grouping, multiplying all those out, you will come up with a testing limit anywhere from $6,000 for the higher risk group and lower cost figure to as high as $18,000. The interesting thing about this range is that most companies are only testing at $100,000 today; I think clearly lower limits should be considered.

How about the other tests and mortality savings? I don't know of any studies that have quantified the extra mortality associated with cocaine but one could assume a cost of $100 and referencing the study I referred to earlier, which showed that among insured applicants there was a 1% positive test hit ratio, we arrive at testing limits between $70,000 and $90,000. Again, this is lower than the $100,000 which appears to be the industry norm today. This raises the question of whether we as an industry would be better served if we were to quantify the extra mortality associated with cocaine usage, various liver function tests and renal tests. I think we would be well served.

My next subject is risk characteristics that are most important in establishing preferred risk groups. I find this to be another interesting subject. This is the one arena where the actuary and underwriter have joined forces to engage in the sport whose foundation is found in the pubs of England over a game of darts.

The evolution of preferred risk underwriting actually dates back to the publication in 1964 in the Surgeon General's Report which highlighted the potential hazards associated with smoking. Coincidentally, in that same year, State Mutual began offering non-smoker policies to its applicants.

CURRENT AND FUTURE UNDERWRITING ISSUES

When you review the past twenty years it becomes clear just how much the underwriting and risk classification process has changed. The risk classification underwriting process in 1968 was simply standard or rated. In that year, according to "Who Writes What," only two companies were offering non-smoker discounts.

Ten years later things changed as the medical community brought forth a series of reports which confirmed the extra mortality associated with smoking; more and more companies began offering non-smoker discounts. In 1978, I think it would be fair to categorize risk classification as non-smoker, smoker and rated. According to "Who Writes What" of that year, 30 companies were offering non-smoker discounts.

Now we come forward to 1988. During the 10-year period between 1978 and 1988, a number of companies, initially brokerage companies, concluded that the original precepts of the non-smoker discount could be extended to a more general preferred risk group. The original concept of non-smoking policies was that if you could make a justifiable discount available to your applicants, a large percentage would qualify. The same held true for the logic behind the preferred risk and so today it would be argued that underwriting risk classifications are preferred, standard and rated. However, most of the companies that have the preferred risk underwriting only make it available to non-smokers. So possibly you might argue that the classifications are preferred non-smoker, non-smoker, smoker and rated.

Having said all that, a number of companies, not terribly large in number, also have expanded the preferred underwriting to smokers. They would argue for preferred non-smoker, non-smoker, preferred smoker, smoker and rated classifications. What a mouthful.

While a number of risk characteristics are considered in establishing whether an applicant qualifies as preferred risk, the following list is not intended to be all inclusive nor is there any implication that every company that has a preferred risk underwriting program has every characteristic as a qualifying characteristic.

- Good Family History
- Blood Pressure
- Build
- Cholesterol/HDL Rate
- Drug/Alcohol Usage
- Liver Function
- Age
- Resting Heart Rate
- Elective Surgery
- Driving Record
- No Rateable Impairment
- Exercise Program

Good family histories: There is an old adage that the best prevention against heart disease is picking the right parents. A typical rule might be no cardiovascularreal disease deaths before age 60-65.

Blood pressure: A preferred risk table may look like: up to age 45, no greater than 135/85mm Hg, age 55, 145/90mm Hg and up to age 65, 160/90mm Hg.

Build: The preferred risk programs that I have seen would require that you weigh no more than 115% of your ideal weight according to the Metropolitan tables.

Cholesterol HDL ratios: Up until about four or five years ago, you could get standard issue with a cholesterol rating of 300. Today to qualify as a preferred risk, your cholesterol rating cannot exceed 200 or 220 and your total cholesterol to HDL must be under 4.5.

Drug/alcohol usage: Absolutely no history of drug or alcohol usage.

Liver function: Not unrelated to drug/alcohol usage, if there is any questionable result of a liver function test, you probably are not going to qualify as a preferred risk.

Age range: The standard programs will not allow over age 65 and a number will not extend it below age 20 or 21.

Resting heart rate: This is not a typical characteristic that I have seen, but for those that do have it would give extra credit for having a reading between 40 and 70 beats per minute, for example.

Elective surgery: You cannot have any elective surgery scheduled, for example, cosmetic surgery.

Driving record: No more than one offense within the last 12 months and absolutely no record of driving while under the influence (DWI).

No ratable impairment: This is kind of a catchall. The most common we have seen are for occupation and, on occasion, for sports; if you are a hang glider enthusiast, you may not be eligible for the preferred risk classification.

Exercise program: This is probably the most subjective one; it is hard to enforce and it is not a terribly common qualifying characteristic.

For those companies that offer preferred smoker rates, the considerations include the following: History of smoking, level of smoking -- this in conjunction with favorable family history, height and weight, blood pressure, being in a low-risk group for HDL/cholesterol consistently within a recent number of years, both resting and stress EKGs normal, and all other blood tests normal. We've also seen credits for annual physical examinations.

Having looked at all of these qualifying characteristics considered for the preferred risk category, how does one actually go about it? There are basically two approaches: one is the old arm chair, i.e., the underwriter evaluates each characteristic separately and as a group, the other is where a series of debits and credits are assigned to each of the characteristics and those applicants who have net credits exceeding a certain level then qualify for the preferred risk classification. In the former case, it's largely judgement, but the vast majority of the companies who subscribe to this imply that a failure on any characteristic will result in other than a preferred rating. However, as we all know, when it is subjective, there will be inconsistent handling of cases.

I almost forgot to mention the last one, probably the oldest of them all, the one that the underwriters borrowed from the actuaries, the old dart board.

MR. MELVIN C. MCFALL: Do you have any idea how the mortality on preferred business compares with the mortality on non-preferred? Are you aware of any studies?

MR. NIGH: Well, having said all that, I'm not aware of any studies that actually quantify. I can tell you that the pricing assumptions included in the pricing process are anywhere from 50% to 60% of the non-smoker mortality. So it is fairly low.

MR. TILLER: I'd like to make one observation that I picked up and then ask a question. Mr. Nigh discussed the value of testing for various single impairments, such as liver function or cocaine, and it seems we could justify something under $100,000. The cost of each additional test is fairly minimal and when you are looking at your limits, the conclusion I drew is that it did not make a lot of sense to really focus on testing a wide range; if you caught one out of a hundred on one test and one out of a hundred on another test, it starts adding up pretty fast. You should be able to actuarially justify significantly lower limits than we are currently using now.

Some of you may not know it, but among his many other talents, Mr. Nigh is a marathoner and travels almost literally all over the world to run in marathons. I would like his personal views on the value of exercise programs in underwriting situations.

MR. NIGH: That's almost unfair. I do enjoy running. I support exercise programs, I'm a real advocate of it. However, to include an exercise program in a preferred risk program, I personally think it is doomed to failure because it is something that is hard to police. Most of the people that get into an exercise program will ultimately withdraw, or alternate in and out. So I don't think it is really something that you can say is long term and therefore I would not suggest including it as one of your qualifying characteristics. The two companies that I'm aware of, did extensive research into what would be the end result, they introduced the products, and they were complete disasters. Maybe someone out there has one that I'm not aware of but, in any event, I don't think exercise programs are worthwhile as a qualifying characteristic for preferred risk underwriting.

MR. MICHAEL J. RICH: Over the past 12-18 months there have been a lot of articles written on expert systems. There have been a lot of presentations made on the use of computers in the underwriting process and I'm not going to try to go over all those articles and repeat everything that has been said. I think one of the things that has come out of all the discussions, though, has been some misconceptions about what an underwriting expert system is and what it is not. For those of you who are in the process of developing your own system or haven't looked into it, I thought maybe a discussion along that line might be helpful.

Some of you may not realize that although a lot of discussion of underwriting by computer has gone on in the last year and a half, it is not really a new topic. As a matter of fact, it may surprise some of you to know that there was a paper presented in 1955 by Charlie Ormsby at the Home Office Life Underwriters Association Meeting, entitled "EDP Comes of Age in the Underwriting Issue Areas."

Being from the same Company as Charlie Ormsby, I can comment on the success of implementing a program at that time. The attempt to develop a computer underwriting system turned out to be a disaster. There were at least two major problems with developing that system. One is that it was very basic and it actually took longer to input the data into the computer system than it took to underwrite in the traditional way. Second, it took a tremendous amount of time and expense to change the system every time that you wanted to change the underwriting rules. Not surprisingly, it didn't work.

Now, despite that, I think that a lot of the ideas and the basic concepts that Charlie presented at that time are really some of the same concepts that we are working with today. A lot of the seeds which were planted some thirty years ago are really starting to bear fruit now. The real differences between then and now are the technological developments, especially relating to expert systems.

I think it would be beneficial to go through at least my impression of what is causing all the talk about expert systems? Where is the impetus coming from? Why do we hear so much about it?

For the most part a lot of companies, especially the larger ones and to a certain extent the smaller ones, have been under some pretty heavy expense pressures. Those pressures have been met in underwriting in two ways -- by reducing the number of people and by liberalizing the underwriting requirements. I think a lot of those underwriting liberalizations were cost rationalized, not cost justified, but so be it. It was a way to cut expenses. Like all great plans, what happened is that we got sideswiped. That is, a little thing called AIDS came along and, all of a sudden, we found ourselves spending a whole lot of money doing blood testing. As you have already heard and seen, blood testing is a very expensive process if you are going to do it right.

The expense pressures have not disappeared and, to a certain extent, they may have even gotten a little worse. You cannot liberalize anymore, at least you are restricted from liberalizing (unless you really want to face the buzz saw), so the question is, where do you turn? The answer is obvious. You turn to the underwriting process itself.

There are two main characteristics of the underwriting process. For every single company, the underwriting process is very heavily paper intensive. Also, you have a system or process that relies, not entirely, but to a large extent on different pre-defined rules and regulations that you follow. Basically those two characteristics run through almost every single company's underwriting process. When you are dealing with something like that, then it really cries out for a technological solution. Unlike 1955, I think with the development of expert systems, we actually have those tools to use now that we didn't have back then.

As you listen to the discussions which go on, there are three different concerns which tend to be raised. The first one is the old question of "Can the computer think like an underwriter?" Can it make up for that expertise and experience developed over the years and the intuition and judgement that an underwriter has developed over the years? Second is the question, "If you're going to be approving cases using the computer, would the field people, in time, learn how to outsmart the system?" That is, once they get familiar with it, know how it works and know what it does and doesn't like, won't they be able to get around the system? The third item, very simple, is cost. Isn't developing an

underwriting expert system awfully costly? All three of these are very legitimate concerns. You cannot dismiss any one of the three out of hand. Before you ever consider developing an expert system, you have to address all three of the issues.

Let's take the first one. Can an expert system replicate an experienced underwriter? To me the answer to that is really rather simple. The answer is yes and no. Very simple. Nothing to tackle there. If you are talking about small amount applications and clean medical history, the answer is obviously yes. There is no question about it. As a matter of fact, in this extreme situation, does it make sense for such applications to go through the entire expensive and time-consuming application process and underwriting procedure? I think the answer is very clearly no, not if there is another way of doing it.

If, on the other hand, we are talking about using the computer to make the total determination on an application of $5 million with some sort of medical history involvement, I don't think anybody would feel comfortable having that case completely reviewed or looked at and approved by an underwriting expert system. It's a lot of discussion on this second case that generates some of the negative reactions that we have seen on underwriting expert systems. I do not know of any company that is developing an underwriting expert system that is replacing the entire underwriting process.

Let's get a little more into detail on this. Now to do that, I need to define two terms -- "predefined actions" and "individual judgement". You can almost guess where I'm going with this. Predefined actions are actions the underwriter takes based on quantified information. Examples would include, but are not limited to, the following: reviewing a clean application, evaluating items like build and blood pressure, ordering an attending physician's statement (APS), requesting the completion of some special form, such as an aviation questionnaire or requesting the answer to an unanswered question. All of these items today are done manually. And all of these items, I think, could very clearly be done with an underwriting expert system. If you stop and think about it, these kinds of actions and more could be done on the $25,000 claim application and lead to a final underwriting decision or they could just as easily be done on the $5 million application with a medical history but with further review by the underwriter. In other words, there are some very basic things common to both cases during underwriting. The build and blood pressure do not change from the $5 million case to the $25,000 case. Obviously there may be additional complications which require further review, but the basic ideas are very much the same.

Examples of "individual judgement" may include the following: special medical interpretation by a doctor, EKG evaluation, some aspects of financial underwriting, and a lot of the intangibles which the underwriter uses (say) in evaluating previous experience he's had with a particular agent or agency which would play a role in an underwriter's final decision.

At least for the near term, no one that I know of is talking about introducing very sophisticated individual judgement into the expert system. In the future it may be possible to do some of those things but what we're talking about is right now. In other words, what we're really talking about with an underwriting expert system is that the expert system itself tries to take away the routine and leave the underwriter to underwrite.

Let's consider the second concern often raised -- can't the agent actually outsmart the system? For the system to work at its best level, data should be inputted out in the field. Now whether it be in the agency, or sometime in the future at the applicant's home, the question is, can the agent outsmart the system? The answer is, to a certain extent, yes. It's all going to depend on how you treat the system. If you treat the system as a right, with which every agency and agent is automatically endowed, then you are asking for trouble. Using a system such as this, you need to have certain quality control checks, and you have to be willing to take the privilege away from an agent who abuses the system. If you're going to get away from that then you are asking for trouble. You're asking for probably as much trouble as you are writing life insurance today without blood testing.

The third concern deals with cost. It is an expensive system to develop. In most cases to develop any sort of system, even of minimal sophistication that you would need to make it worthwhile, you're starting at a price tag of $1 million. Even $1 million is probably on the low side. It takes a lot of money to develop a system. Therefore the obvious question is, "Doesn't this pretty much just restrict its use to the larger companies?" I would say that what it probably does is restrict its development from scratch to the larger companies. I think what it does do, though, and I think you're starting to see it now, is give impetus to the development of packages. You're going to see companies go out and develop underwriting expert systems that other companies, medium and smaller-sized companies, can buy. And they are going to be able to buy them a lot cheaper than John Hancock is spending developing on our own. Obviously what we're looking for is that advantage in getting the jump on the field. We want certain things tailor-made specifically for us and for our purposes. I think in time what you're going to see are systems developed to be sold by third parties. You might even see some insurance companies developing and then selling their own systems.

Of course, all of us have been involved in buying packages from third parties. It never is simply a plug it in and walk away situation. There obviously has to be a lot of adaptation to your own issue systems and to your own type of entry of data. It is not going to be a simple process, but on the other hand, I think for the long term, it is going to be something medium and smaller-sized companies are going to be able to avail themselves of. It is my feeling that the development of expert systems will progress steadily and we are going to see their use more and more in the industry. It is going to start in the large companies and work its way down to the medium and smaller-sized companies.

My estimate, and it is probably on the low side, is that 50% to 60% of the applications will be approved by underwriting expert systems, with an assist for the remainder of the applications by an underwriter. The underwriter may have to do more work with the applications, but some of the basic underwriting is going to be done even on the larger cases by expert systems. Just how far and how fast we proceed may very well depend as much on our ability to see beyond our own limitations as our need to wait for further technological advances.

MR. JOHN J. LIBERA, JR.: You mentioned quality controls and checks and the willingness to take away the privileges from the agent. Could you give examples of some of those that you included in your system?

MR. RICH: Let me just put things in perspective. We are still developing our system. We hope to go out in the field sometime around the second quarter of next year, so we're quite far along with it.

With or without artificial intelligence and expert systems, you have to be concerned with the quality of data entry. Does the information entered differ from what is on the application? The controls that I am talking about initially deal with spot checking. Take a certain number of cases from selected agencies and find out how closely that information inputted is to the information on the application. You have to start asking questions when you find that information different. Was it simply a keypunch error or did it go a lot further than that? You're going to really be able to tell, for example, in the case of a missed digit in the address versus a missed mention of open heart surgery last week. The basic checks are, in many cases, the same kinds of checks we do today; for example, using inspection report information and directly calling the applicant to check on some of the information.

Let's face it, especially on a smaller amount case, without an APS, if the applicant and the agent are in cahoots together, you are going to miss a lot regardless of whether you have an expert system. In that case the problem and its resolution is going to entail more than an underwriting expert system.

MR. LIBERA: I think that might have answered my second question which was, given good transcription quality, do you see very much of a difference between the opportunity for the agent and the client fooling the underwriter versus fooling the automatic system?

MR. RICH: I think it's probably the same if they are in cahoots together. One of the things that concerns us, independent of an expert system, is the quality of information that is inputted into the system, because we have field entry now. We have a fairly high error rate in what is inputted into the system today. Your first reaction is, does that mean there are games going on out there? First of all, we don't underwrite directly off of that information. I tend not to be concerned that somebody is playing games. In fact, the commission information is the most common input error that occurs. I guess from one point of view if agents are going to play games, the last thing they are going to do is input the wrong agent number and miss a commission payment.

MR. LIBERA: Do you have any plans to use the information going the other way? For example, extending non-medical privileges based on the kind of business that the agent gives you.

MR. RICH: We have not discussed it at length, but there is no question that it's going to give you a much better handle than you have today on what you are really getting from each agency. Right now for each agent, we develop overall figures. And even when we develop figures by agency, it is very difficult to isolate different parameters. You tend to have one variable, and that is basically it, and then you throw everything else into a pot and you keep your fingers crossed that the numbers you get out make sense. It is an interesting consideration because the database that you would actually be developing will have a lot more information than you ever had before.

MR. LIBERA: Is there any particular way you are using artificial intelligence systems in the issue process or is it more just an automation of the process that

doesn't necessarily rely on the particular power of the artificial intelligence software?

MR. RICH: Cost justifying an underwriting expert system is not really the biggest problem that you face. One of the big areas of concern is how it ties into the whole issue process. I talked about the underwriting process being very paper intensive. We spend about three quarters of our underwriting time passing papers from one area to the other. Maybe nobody else will admit it or everybody else has already solved the problem. To a certain extent I think we tend to be a paper-moving factory. We move a lot of papers from place to place, including back and forth from issue processing, even after it's approved. I don't think there is any question that the process can be dramatically changed. It doesn't have to be an expert system but it can be dramatically changed through a lot of work with the computers. The fact that we're developing a system allows us to make a lot of changes that on their own might be more expensive. The obvious next step, and some companies may even do it now, is actually printing the policy out at the agency. That is really not too far away.

MR. TILLER: It has been said quite frequently that underwriting is an art not a science. I have tried to explain that to some actuaries when they did not understand why their mortality experience was different than what was priced. In an era of increasing concern over discrimination and a need for consistency, is part of the drive toward expert systems something to show that it is totally nondiscriminatory, that is, a predefined set of rules applied 100% of the time, and that you are getting consistent underwriting? Will it make it more scientific or actuarial?

MR. RICH: Obviously you've got different size shops; some of you may have two underwriters, others of you may have eighty or ninety underwriters, so it is hard to generalize. If you have two underwriters, consistency is not usually that big an issue. I mean they can look over each other's shoulders.

One of the big advantages we saw, but we didn't try quantifying it, was the whole question of training, consistency and quality of the decisions which are made. They all kind of fit in when you stop and think about it. There is no reason why an underwriting expert system cannot serve as a training tool. For example, a particular question may come out of the system concerning some cardiovascular risk factor; why can't the underwriter push a button and basically find out the basis of that question?

As far as consistent underwriting decisions go, there is no question that once the information is gathered and put into the system, you are going to improve the consistency. Now, let me play the devil's advocate for a minute and say that if you take that consistency too far there is a real question of how much service you are really doing for your company. If you talk to the underwriting people, different agencies and agents submit a different quality of business. Underwriting is not only underwriting the applicant who comes in but it is also underwriting the agent and the type of business which you receive.

All the underwriting expert systems I have seen and heard about, provide for the underwriter to overrule the expert system. That is the way that it should be. The system should not be driving everything that you are doing, but it should be a tremendous assist to what you are doing.

MR. GREGG R. SADLER: Have your underwriters reacted to the development of the system and have you received any agent reaction?

MR. RICH: As far as the underwriter reaction, I think at this point it is probably blind faith. Underwriters have been involved very heavily in the development of this system and that is really the whole key. Our underwriters are writing the rules. They have been taught how to write them so that the system can read them and they have been very much involved. One concern of ours is, how the underwriters who are not day-to-day involved with this will react to it? We have had a number of sessions to explain to them what it is and what it is not. They have seen the system in various stages of development. I don't know if they really completely understand it and understand where it is going.

As far as the reaction of the field, we have shown this to a number of field people. Anything you present to field people that they perceive as making their life easier will be bought. I have never seen somebody from the field say, "That is going to make my life easier but how much is it going to cost the company?" From their point of view it's an easy thing to sell because they can see the positive. As a matter of fact, I really don't see any negatives involved in it. I don't see any reason why they would sit there and look at it and say "I wouldn't ever want to be involved with a system like that." Some of them may be afraid when you talk about the fact they may have portable personal computers (PCs) being carried into the home at some time and they may be required to do some of the input, but I believe most of them are used to computers.

MR. JOHN GILFOYLE: In reference to application data entry done in the client's home -- there are two major reasons why it's going to come potentially faster than you may anticipate. First, you alluded before to the coding of the application at the branch. While this speeds up the whole process, you also have a problem: does anybody ever see that information? However, if you print it out at the client's home, the client signs the application. It is a direct copy of what is already in the machine, and that machine will then pass it back up to your head office. There is no transcription error, or if there is, the client signs the transcription, then you will have your normal misrepresentation problems.

MR. RICH: Is the approval of the application done by the system?

MR. GILFOYLE: That is the second reason. It depends on the size. If it is very clean, non-medical information within the limit prescribed by the company, then actually the company is bound on that basis right there and then. Although it is not happening right now you could physically put out the policy right then and there.

MR. RICH: Do you actually give approval in the home?

MR. GILFOYLE: Subject to the constraints laid down inside the machine.

MR. RICH: For example, like Medical Information Bureau (MIB) or things of that nature?

MR. GILFOYLE: It has been designed so that normal questions are asked about whether you have already been declined or postponed, or whatever, and if the client answers that question bound by that, then the company is bound if within acceptable limits. If the client lies then it is a misrepresentation and the

company is then unbound. You're not going to type something into the machine so you can check for existing policies; you just ask the client the question about existing policy sizes and act accordingly.

MR. RICH: Well for example, when is the MIB done then?

MR. GILFOYLE: The MIB is done that night or whenever it's loaded up into the machine.

MR. RICH: Okay, and if you've given an approval and an MIB shows up?

MR. GILFOYLE: The client has probably lied. We haven't come across the situation yet but it is probably a material misrepresentation and the company is not bound anymore. You go back and say "Sorry, there are some new facts which have come to light."

MR. G. THOMAS MITCHELL: How does the ordering of requirements such as APSs fit into your scheme of things?

MR. RICH: It is going to depend. APSs cause all kinds of problems for an underwriting expert system. Forget the fact of whether you can even read the doctor's writing or not. That is a whole different matter.

I think that there are, and what percentage is going to fall into this category I'm not quite sure, a number of either impairments or triggers for which very clearly the underwriter would routinely order an APS. In many cases, and there may be size constraints, if a person says he is taking blood pressure medication, more than likely you are going to get that APS. The question is, does it really have to come to an underwriter to say "Yeah, that is blood pressure medication they said they were on, and I now want to order an APS." Obviously there are all kinds of extremes and you are going to go to the other end where you are going to get certain impairments or a certain set of circumstances which are going to have to be physically reviewed to determine whether you have enough information or whether an APS is needed.

MR. TILLER: Before Mr. Sadler starts, I'd like to ask one question. Would all of you who have now or in the recent past have had active hands-on management or responsibility for the underwriting area in your organization, please raise your hands real quickly. That's a pretty good group. It's not an easy responsibility and I don't think it's one that we actuaries were very well trained for. I once found myself in a situation where I had a $10 million signing authority and after looking at about five cases, I managed to sign my authority over to somebody else. It wasn't something I was ready for.

MR. SADLER: Additional laboratory testing information, which John had referred to earlier, has continued the fundamental change in risk appraisal toward risk factor underwriting. I suspect with the additional information that will be available in the future, the trend will continue.

As controversial as HIV testing has been in the past, and we seem to be winning the battles there, I suspect genetic testing in the future is going to be just as controversial or maybe even more so. Controversial or not, I think it is an issue that we are going to have to deal with down the road. As we speak, scientists are already in the process of deciphering all the genes in the human body. What implications will this have for our society in the future? What

effect will it have on insurers, particularly in the area of risk appraisal? What will the public acceptance be of genetic testing if used in the risk appraisal process? These and other questions will soon be surfacing as science comes closer and closer to understanding human genes.

Genetic testing is already being used in some areas. In a landmark trial in Orlando, Florida in February 1988, the defendant in a rape trial was convicted largely due to DNA evidence. Since that verdict, several rape and murder trials in the United States have resulted in convictions based on DNA "finger printing." There are many other cases pending at the present time where this kind of evidence may be used.

Other uses of genetic testing are in prenatal diagnosis of certain genetic diseases, detection of viral infections (including AIDS), cancer research and tracing evolution.

Several key developments have been accelerating the pace toward genetic testing, including Linkage Analysis, Gene Amplification Technology and the Genome Project.

Linkage analysis is one of the basic tools of classic genetics. The objective in linkage analysis is to identify markers that tend to "crossover" with certain genes during the process of meiosis. Meiosis is the special method of cell division that occurs during the formation of germ cells (sperm or eggs).

During the process of meiosis, sections of chromosomes sometimes "crossover" exchanging segments of equal length. The result is two germ cells that carry the resulting combination of DNA.

Sometimes it is possible to identify a marker that is close enough to a mutant diseased gene that it will usually "crossover" with the diseased gene during this process. The closer the marker lies to the actual location of the gene, the greater the chance that it will crossover with the gene. Ideally, markers on each side of the gene (called "flanking markers") can be identified which greatly increases the probability that the gene is present if both markers are present.

Markers have already been identified for several diseases, including Duchenne Muscular Dystrophy, Huntington's Chorea, Cystic Fibrosis and others. It looks as though markers will soon be identified for many other diseases, including Alzheimer's disease and manic depression.

There are some problems with linkage analysis. First of all, linkage between markers and mutant genes is not 100%. Therefore, you cannot be sure that the diseased gene is present in all cases where the marker has been identified. Markers for some diseases are better than others.

Also, linkage studies require analysis of multiple family members -- not very practical for the risk appraisal process. These studies are also technically difficult to conduct and are very expensive ($500 to $1,000 per person).

Direct genetic tests could be preferable to linkage analysis for several reasons. These tests actually identify the disease-causing gene. Also, this technique does not require the analysis of multiple family members. However, tests are currently available for only a few rare conditions. Also, in the past it has been difficult to obtain adequate amounts of DNA for analysis.

More and more of these disease-causing genes will be identified in the future.

In addition, a new technology called "gene amplification technology" is greatly facilitating this process. The gene amplification method called "Polymerase Chain Reaction" or PCR is proving to be very beneficial. PCR is a way to synthesize millions of copies of a single sequence of DNA in a few hours. According to an article in *Science Magazine*, this method has been used to analyze DNA from a Woolly Mammoth who last walked the Siberian Steppes some 40,000 years ago. The mammoth had been frozen in the Siberian ice until it was chipped out about ten years ago and, even though DNA breaks down very readily, researchers were able to produce enough mitochondrial DNA to determine a nucleotide sequence.

Further advances in gene amplification technology may be a key development in the practical application of genetic testing in the future.

The genome project is a joint project of the National Institute of Health and the Department of Energy. Its objective is to determine the identity, position, and function of the 50,000-100,000 genes in the human body. The estimated cost of this project is $3 billion. Even though this project is in the initial stages, future research in this area could provide a wealth of information applicable to genetic testing.

Certainly, genetic testing could be useful in risk appraisal in the future. For a long time, underwriters have been using family history as a useful risk factor.

In the 1983 impairment study, policies issued standard but with an MIB code for a family history of cardiovascular disease had an overall mortality ratio of 188% of expected.

There are many genetically related diseases:

1. Coronary Artery Disease
2. Diabetes
3. Huntington's Chorea
4. Hemophilia
5. Cystic Fibrosis
6. Muscular Dystrophy
7. Alzheimer's Disease
8. Manic Depression

In addition, many forms of cancer may be genetically related.

Certainly, in any testing program (genetic or other), basic underwriting principles should be followed. First, our job is to assess risk -- not to diagnose a medical condition. Secondly, the underwriter's job is to classify risks equitably and consistently. Third, confidentiality is essential. And fourth, all applicable laws and regulations should be followed.

Of course, there are many obstacles at this point to genetic testing for insurance purposes. Currently, there are few genetic tests available and the few tests that are available are for fairly rare disorders.

If genetic testing becomes more available in the future, there are other concerns that must be addressed. It may be very difficult, in the absence of other

supporting information, to take adverse underwriting action on asymptomatic individuals who may not develop symptoms for many years and for whom no treatment is currently needed. Disclosure of this information to the proposed insured is another problem.

The "false positives" that may occur in linkage analysis would also be troublesome in the risk appraisal process.

There may also be a strong public view that it is unfair to penalize an individual for his or her genes. Finally, there would likely be sales and marketing resistance to genetic testing.

Listed below are some forces that could make genetic testing desirable in risk appraisal:

1. Ability to identify serious and common mortality/morbidity risks (not just rare conditions)
2. High specificity and sensitivity of testing
3. Safe and easy testing
4. Good cost-benefit ratio
5. Wide use in clinical medicine
6. Antiselection
7. Public/agent acceptance
8. Lower premiums for better risks

I believe the public acceptance of risk appraisal has been growing over the last few years. According to the 1987 ACLI public survey, 61% of those surveyed agreed that it should be okay for insurers to use HIV antibody testing. This is up from 49% in 1985 and 56% in 1986. Sixty-two percent of those surveyed agreed that HIV positives should be charged a higher premium. However, 52% indicated that insurers should not be allowed to decline coverage on HIV positives.

A major public concern is the issue of confidentiality. According to the 1987 ACLI survey, 40% of those surveyed indicated that insurers could not be relied upon to keep testing data confidential. I believe our industry has a very good track record on confidentiality in the past, but we must be very diligent to maintain confidentiality in the future or risk losing the ability to gather certain types of information.

In summary, genetic testing may be several years down the road, but it is very likely that advances in technology will ultimately make genetic testing more common and could ultimately have a dramatic effect on the risk appraisal process.