Presentation on the Scope, Charge, and Progress to Date of the National Academy of Sciences' Committee on Intellectual Property Rights in Genomics and Protein-Related Invention

David Korn, M.D.

DR. TUCKSON: Let's move on on the agenda. As you remember at our priority setting session in March, the committee identified gene patents and licensing policies and practices as a high priority issue, because of its potential to effect access to genetic technologies.

We elected to defer in-depth consideration of the issue in light of the work that we became aware of being conducted by the National Academy of Sciences' Committee on Intellectual Property Rights in Genomics and Related Inventions.

The NAS committee began its work in February of this year. That study by the NAS is being sponsored by NIH, specifically NCI, NHGRI, NIGMS, NICHD, and the NIH Office of Technology Transfer. Tim Leshan, Director of the Policy and Program Analysis Branch at NHGRI, serves as the NIH liaison to our committee. We are very happy that he is here and attentive.

MR. LESHAN: Yes, very attentive. Thank you.

DR. TUCKSON: Now, we're very blessed that we have a guest from that committee, Dr. David Korn, who in addition to being my friend is a Senior Vice President for Biomedical Health Sciences Research at the Association of American Medical Colleges, and is a member of the NAS committee. He has kindly agreed to brief us about the committee's charge, scope, and progress to date. For your information, his biosketch is at Tab 1 of the briefing book.

I'll just say parenthetically here that the committee is at a very delicate stage in its discussions. So David will provide us with I'm sure absolutely the maximum amount of information that he can possibly provide us with at this moment. He may not be able to provide us with everything because of the status of his committee, but I'm sure he will clarify all of that as we go forward.

DR. KORN: Well, let me thank you all very much for the privilege of being here with you today to talk about this committee, which I had a role in instigating, I think is the fair thing to say.

But I also have to tell you that the National Academy has very ironclad rules about what can and cannot be said about any committee that's underway. So it is sort of like I can give you my name, rank, and serial number, sir, and that's about it. But no, it can be better than that. I really cannot even hint at presenting to you any flavor of discussions or conjecture about possible findings and recommendations of the committee. It is simply verboten. So I can't do that, and I apologize.

But in any event, this committee was put together, and the members of the committee are shown on this slide. I think it is just worth noting, Shirley Tilghman, who is a very eminent developmental biologist in her past life is now the President of Princeton University. She co-chairs this committee with Rod McKelvie, who is very well known in the patent law business, a former judge in the courts in Delaware, in which more companies are incorporated than any other state in the United States.

So Delaware courts have a very rich history in dealing with corporate issues, including intellectual property. Ashish Arora is a Professor of Economics and Public Policy at Carnegie

Mellon, who with others, including Wes Cohen at Duke, and such, has spent a lot of his recent career studying the economics of innovation, which certainly patents relate to.

Helen Berman is a Professor of Chemistry and Chemical Biology at Rutgers, and is the curator of probably the most definitive web-based repository of protein crystal structures, and cares much about proteomics research. Joyce Brinton has been, and is retiring now, the Director of Technology Transfer at Harvard University.

Stephen Burley, a former academic, I believe at U.C. San Diego is now the Chief Scientific Officer at a small biotech company. Todd Dickinson is now the Intellectual Property Counsel of General Electric. Under the Clinton administration, he was Commissioner of the U.S. Patent and Trademark Office.

Rochelle Dreyfuss at NYU and Rebecca Eisenberg at the University of Michigan are both eminent scholars, Professors of Law in the area of intellectual property law. Very well known scholars. Charles Hartman is an investor who is into starting up biotech companies.

Dan Kevles is a very well known historian of science. He spent a large part of his career at California Institute of Technology, and more recently was recruited away by Yale University. One of his better known and more recent works concerns the David Baltimore case that some of you may have been familiar with.

George Milne is a former Senior Corporate Officer of Pfizer, now dabbling in investments and biotech start ups. Richard Scheller is a former faculty member of mine at Stanford who is now the Executive V.P. for Research at Genentech.

Rochelle Seide is a litigator. She is in the private practice of law and specializes in intellectual property law. Bob Waterston's name is known I think to all of you. One of the key contributors to the human genome map, now out in Seattle.

Nancy Wexler is well known to all of you for her work in hereditary disease, especially Huntington's disease. Brian Wright is a Professor of Agriculture in Resource Economics at U.C. Berkeley. It is a very strong department at Berkeley.

So what we were asked to do by the NIH was to examine trends in the number and nature, well, you can read this. But it is basically what kind of patents are being issued and granted to technologies related to genomics and proteomics.

Some study of the procedures that our patent and trademark office is using are relative to those used by others, specifically in Europe and Japan. How the patenting of genomic and proteomic inventions and/or licensing practices may be affecting research and intervention and, based on our findings, recommend steps the NIH and others might take to ensure the productivity of research, innovation, and so forth.

DR. LEONARD: David, could you clarify? I thought part of the charge was also to look at clinical impact, but I'm not seeing that on your list.

DR. KORN: The charge slide that was given to me by the committee did not list it, but I will come to it, because that is a topic that the committee has been looking into.

I just wanted to point out to you that there is a website that has all of the documents and agenda of all the meetings and almost anything you want to know about this committee, you can find on that website.

So what sort of things have we looked at to date? One has been the policies, procedures, and operations of the patent in the trademark office. That focuses of course on the criteria which are established in U.S. law, and about any one of which we could probably spend half a day talking and arguing, because every one of these criteria has been challenged in the area especially of gene patents. That is patents that have been issued, and have been challenged on the basis of their utility, and on the basis of their novelty and non-obviousness. That means to a person skilled in the field. On their written description and enablement, especially vis-a-vis the scope of their claims.

That is you claim something when you file an application, and you are supposed to demonstrate convincingly that you have what you are claiming, and that you have actually got it. Not you are thinking about it or wishing about it, but that you actually have it. There has been some quite heated discussion in the literature about patents regarding the perceived variance between the scope of some claims and the written description and ability of backing them up.

Then we are going to be looking at international policies and practices, Europe and Japan. We are looking for evidence about ways that individuals, entities, and companies have managed what Rebecca Eisenberg has dubbed the "patent thicket." Patent thicket means you want to do something. In order to do it, you find that you have to negotiate intellectual property rights with a dozen, two dozen, or eight dozen different owners of bits and pieces of what you want to do.

A very interesting example of a case where that has recently occurred is in golden rice, which was developed for the specific purposes of dealing with Vitamin A deficiency. In order to get from the discovery the invention of golden rice, which was a very difficult and long-time genetic technology problem in ag biotech, they had to work their way through about 40 or 60, I think, patents on different bits and pieces of what they had done to get the product.

All of that had to be negotiated before the discovery could be then reduced into benefit for people. That is, before you can get a company to begin manufacturing it, all of this intellectual property stuff had to be negotiated. I gathered from a paper in Science last fall that it took well over a year to do that.

One of the reasons it succeeded was because nobody thought anybody was going to make much money on this. It's going to be aimed mainly at a developing world where people need this foodstuff, but there certainly isn't a lot of money.

There has been a fair amount of discussion about the research exemption. Does it exist? I'm going to divert, if I may, for a couple of seconds or minutes, because I'm very interested in this for obvious reasons.

There is a case that was decided by the appellate court in the United States that deals with intellectual property. It is called the Court of Appeals for the Federal Circuit, or the CAFC. Unlike all other jurisdiction in this country, there is only one appellate court that deals with all intellectual property cases that come out of district courts. One appellate court. It basically makes the law on patents. Rarely, rarely does a case get bumped up to the Supreme Court from this court. That is, the Supreme Court shows this court great deference.

So what is the issue? Well, the issue is that after the patent statute the Constitution defines the rights of artists and inventors to have exclusive use of their inventions for a period of time to promote progress in the arts and technologies, I think it says.

But in 1813, a Justice, in a case known as Whittemore v. Cutter, wrote in an opinion about a patent infringement these words, that "It could never have been the intention of the legislature to punish a man, who constructed...a [patented] machine merely for philosophical experiments, or for the purpose of ascertaining the sufficiency of the machine to produce its desired effects." That was the first legal writing that said it might be possible to "infringe" a patent and not really be infringing, yet in terms of the legal sense that you could do things with it and not be infringing.

The same Justice, in the same year in another case some months later, went on to say that, "Patent infringement must concern the making of the patented thing with the intent to use for profit, and not for the mere purpose of philosophical experimentation, or to ascertain the verity and exactness of the specification."

So working on the patent to understand it better, working on the patent not for profit, but for philosophical experimentation, he said were allowed. For almost 200 years, that has essentially been the base of case law. That means this is not in statute, but it has been accepted as case law by other judges.

Why is it important? Because at least in universities where a lot of this research that you're concerned with gets done, it has generally been assumed that they are operating a non-commercial, not for profit, seeking knowledge, and understanding fashion, and they have been cloaked, protected, by this experimental use exemption.

Well, along came a professor named John Madey, a physical scientist of some accomplishment, who sued Duke University in a case that went up to the appellate court over the use of some form of free-electron laser equipment on which he held patents. He had been a major inventor of free-electron lasers.

This court now in 2002 said that "Any act in the furtherance of the alleged infringer's legitimate business and not solely for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry, that act does not qualify for the very narrow and strictly limited experimental use defense."

Now, I don't know whether Hunt Willard and others would say that what they do every day in their university work is to satisfy idle curiosity, or for amusement, or for strictly philosophical inquiry. But the court then went on to say, "Our precedent does not immunize use that is in any way commercial...[nor] any conduct in keeping with the alleged infringer's legitimate business, regardless of commercial implications."

So for the first time now in the law since 1813, the idea that you could do these things if it was not commercial has now been blown away by this CAFC holding. It went on just to rub the salt in a little bit more, that "Such activities as obtaining research grants and educating students and illuminating faculty unmistakably further the institution's [Duke's] legitimate business objectives."

Now, given that, I think the answer to whether or not there is a research exemption at this moment is highly in doubt. This has some relevance to the point that I think Debra Leonard wants me to get to, which I will. We are trying with other organizations here in town and the

AAAS to do a blinded survey of university experience post-Madey to see whether there are indeed challenges and demands for licenses and payments, and whether he used various kinds of patented inventions that are widely used as research tools, widely used, and almost anybody working in current genomics and proteomics is using somebody's research tools one way or another.

There is also some effort to draft a statutory exemption for research, such as that by the American Intellectual Property Lawyers Association. But I won't take your time with that. Their proposed use, their proposed exemption is exceedingly narrow, and would not cover most of the kinds of research uses that university faculty and businesses doing research, I mean, basic research and not necessarily product development, would be protected by.

We have been looking at the issue of licenses, as well as patents, and material transfer agreements, which are these contractual documents that faculty use when they are sharing materials, reagents, organisms, cell lines, whatever, with others either in industry or in universities. These things have become a major burdensome impediment to the sharing of research reagents and tools, and living organisms.

This is not the patent law, these are material transfer agreements. Then at the last meeting, they did turn their attention to the effect of patents on genetic testing and genetic gene patents on the practice of medicine.

The issue here is this. That there are, as you may know, a number of cases now where a genetic mutation has been described that has let's say some kind of correlation with an interesting phenotype. It may in fact be the dominant gene, or it may be a gene with some statistical correlate, and one doesn't really know what its pathophysiological role is.

The patentor of the gene can essentially obtain a patent, and the patentor of the mutation can essentially obtain a patent that will prevent anyone from using that patent without that owner's permission. What has happened in some of these cases, such as Canavan's and one of the hemochromatosis genes, and I know Debbie can give you others, is that the owner, which is frequently a university, by the way, almost always a university, gives a highly restrictive license to A, the provider of the test.

Let's take BRCA. The provider is Myriad Genetics. They have a worldwide exclusive on the practice of the test. The fact is that if they choose to enforce their license, which they do, they will say that no one in the world has the right to do a BRCA test on any specimen, except them. It is a nice business position to be in, I have to say.

By the way, let me make clear now that I am expressing my personal views about this. I think I'm being factual about what I'm describing, but the views are mine and not the committee's. I don't want any misunderstanding about that.

So the issue that I think people like Debra Leonard and others who are in her field of medicine are concerned about is that these patent owners and licensees are not intending to develop their patent by providing test kits, special equipment, special instruments, or special reagents that other users would probably eagerly buy if they were of high quality and reliable. They are simply saying nobody else can do it.

There is an argument made here that this essentially is saying that an owner of a piece of knowledge, a quantum of information, a bit of information, can essentially prevent other qualified

professionals, physicians in this case, from using that knowledge to deal with their patients. They have to go to the exclusive licensee in order to get the work done that will tell them what is going on with a given patient.

This is the issue that is embodied in the words that are here on this slide. Now, I will tell you that in our country, there are two statutory exemptions. Statutory, that is in law, passed by Congress through the Patent Act. One of them in 1984 known by its authors, Senator Hatch and Congressman Waxman, allows activities and uses reasonably related solely to developing information required to secure FDA approval.

What this is really about is generics and allowing those who want to make generic copies of patented products to begin to develop the information on their generic that they need in order to go to the FDA and get approval to sell that generic when the patent term has expired.

They don't have to wait until the patent term expires to begin all of that preparatory work. They gain some years by being able to start working on it ahead of time, and having their package ready to give to the FDA.

That exemption has also been reduced by this appellate court in another recent case. They clearly don't like exemptions, this court. But it does exist.

Now, the other one, which is more pertinent to Debra Leonard and her colleague's issue, is the First-Ganske, Senator First and former Congressman Ganske, amendment of 1994 which permits medical practitioners to practice patented medical and surgical procedures.

What is a patented medical and surgical procedure? Well, in this instance, it was an ophthalmologist who wanted to patent a type of curved incision in the cornea. He wanted to own it, patent it, and control its use. There was a lot of unhappiness about that sort of thing. So this amendment was passed to physicians First and Ganske, patented medical and surgical procedures on a body. That's your body, my body, a body, but excludes the practices of processes that would violate biotech patents, and specifically the provision of clinical laboratory services regulated under the Clinical Laboratories Improvement Amendments, which are known as CLIA, which is the statutory body of law that basically regulates diagnostic laboratory services performed in the practice of medicine.

These are the only two statutory exemptions, as I say, and the First-Ganske explicitly excludes laboratory diagnostics which would be the kind of medical practice that we are talking about here with use of mutations in diagnosis. So they are explicitly excluded.

Just to finish, the committee is on a very fast pace considering the complexity of this topic, and expects to be finished at an April meeting, and release a report by June, which I think will be an extreme amount of work that has to be done to get to a report. But that is the schedule the committee is on.

I think that is what the committee is up to. Those are the topics that it has looked at. I think I'll stop here. I'd be happy to take any questions that the Chair permits.

DR. TUCKSON: The floor is open. Ed?

DR. McCABE: Dr. Korn, you mentioned the Canavan's example, and you talked about exclusive licensing. But Canavan's takes that one further, where it is exclusive, an attempt at exclusivity that basically removes a diagnostic from patient availability. Can you comment on that, please?

DR. KORN: Well, let me try, Dr. McCabe, and see if I do it addressing your issue.

The argument is raised that if a particular, and this is all David Korn, and not the National Academy and its committee, okay? It is my opinion. The argument has been that when there is an exclusive provider of a laboratory diagnostic test, one, they can set whatever price they want, in that is there is no competition. Two, there may be an inconvenience in getting samples from wherever the patients are to wherever the privileged provider may be. Three, that there is no real independent check on the validity of the work being performed by that provider.

That is if you get a result, you cannot go to another licensed, credible laboratory and have that result checked. Sometimes results are wrong. If you don't get an independent check, you can have some really unfortunate consequences that were not necessary because you are proceeding on a problem that may not exist, or a problem that is different from what you were told.

All of these are arguments about the undesirability of having an exclusive provider of a diagnostic test, and you probably know if you read the newspapers that in France, and I believe in Canada, the government is actually backing professionals who are challenging the Myriad patent on BRCA1. They are doing it on the grounds of protecting the public health of their particular societies. That is an answer.

Now, I'm a pathologist. At least I used to be. To my knowledge, there has never been in the practice of pathology, and Debra can correct me, any such exclusivity imposed on the practicing credentialed community. There certainly have been instances where practitioners will choose to send specimens to reference laboratories, because there may be very rare diseases, or they may be very difficult tests that require a lot of special expertise and equipment.

It is often an economic, efficiency, and a quality decision that says, it would be better to send it over there to that lab because they do them all, and they know what they're doing, rather than have our lab try to do something that we may see once or twice a year or two.

So certainly there are reference labs that do have semi-monopolies on certain tests, but that is certainly by the desire of the professionals that it is the best way to deliver the care. It is not imposed. There certainly are companies that have been very successful making important diagnostic laboratory equipment, like FAC sorters, robot chemists, and all. They have a right to protect their patents and make sure you don't try to build your own and copy their machine, and then use it for your own practice.

But most people who aren't nuts would be happy to buy good equipment, good reagents, and good kits, because first of all, they are reliable. Secondly, it is easier, it is simpler, it is easier to teach the technicians how to do it. So there is a great desire to have these kinds of things, and people will buy them and use them if they are available.

But in these instances, that is not what we're talking about. It is not a product that somebody is trying to use illicitly. It is a piece of information. That is what is different.

It worries me about what it means for the future medical practice, frankly, because we are still at the dawn of the genomic revolution. We are still at the dawn. I mean, there will be gazillions

more sequences that are going to have some kind of relationship with various human traits and disorders of interest.

The idea that every single of them might be restricted from use in this way, I just find a very distasteful scenario. It just seems to me a path that medicine has not taken before. I don't see it has a happy path. But that's my personal opinion.

DR. TUCKSON: Emily is next, and then we'll just go right on around like that.

DR. WINN-DEEN: So I just wanted to ask you if you could say a little bit more than you're going to generate a report. Can you talk about at least sort of maybe the table of contents? Is this going to be just a review of the state of the state? Or do you intend to make some specific recommendations? You don't have to say what the recommendations are, because I understand they

DR. KORN: I think the committee is fully empowered to make recommendations. I don't know what kind of recommendations that it will choose to make. I do believe that there is a wealth of perspective, expertise, and experience from the roster. It is a very distinguished group of people. I expect that they will make findings, and they will make recommendations.

DR. TUCKSON: That was good.

(Laughter.)

DR. TUCKSON: Brad?

MR. MARGUS: So can you help me again with the distinction with genetic information? It seems that any patent gives the inventor a monopoly, and that can be troubling, but that is the way our system is, and it is necessary for a lot of reasons.

So I'm trying to hear. It seems like the explanation in this case is that it is different because somehow human health is involved, and there is more risks that it may not be made available to everyone.

I understand that, except drawing the distinction between genetic information and any drug for which there is a monopoly, and there is the risk that Pfizer or Merck will not sell their drug to everyone in the world, or make it available to everyone, just in the same way as the genetic test wouldn't be available, and the drug may not be available. Yet no one is suggesting that we don't ? - the drugs.

If the difference is that there is a pill instead of a piece of information, can you elaborate on that? I mean, in either case it could have taken 20 years to develop that piece of information, just as it takes 20 years to develop a drug.

DR. KORN: Well, you know, as a matter of fact, a lot of times information is available to those using the information well before a patent is ever issued, as it turns out. But that's not the point.

I think the issue is that historically at least, the practice of medicine has not been limited in terms of what practitioners may know and apply to their patients, or do to their bodies, because somebody owns something. I mean, if you look back at the history of medicine, it is very economic. That is, people got their goodies, their kicks, but when your name is on things, you

know, you have a lot of surgical procedures that have great surgeon's names associated with them.

Jones' approach to the gall bladder, and Smith's approach to the left kidney, and this, that, and the other thing. They got their pleasure by describing these approaches, and then people use their name to describe it. They didn't say, I'm going to be the only one who can do this, or I and these two people that I'm appointing are the only two people in the world who are able to do it. They let the professionals use the information.

I think that is a tradition in medicine that I have great respect for. I just find it offensive, personally, to be told that this is a piece of information that you may use in your practice, and you're not allowed to. I mean, that doesn't mean it is wrong. It is certainly legal, it is certainly legal. I just find it very distasteful.

I have trouble envisioning medicine in 2050 when there are, as I said, gazillions of these bits and pieces and quantum of information that all have intellectual property tied onto them. Now, you could say to me, that's just tough cookies. You know, you are living in a new age

MR. MARGUS: Most of (inaudible) today will be (inaudible) by then.

DR. KORN: Well, maybe. But the point of the matter is, and I would certainly defer to your expertise on this, I imagine that if you are the sole repository of the mutations in a particular gene of interest, that you can always selectively file for more patents on a different mutation in the same gene that might have equally interesting clinical correlates, and kind of keep rolling your ownership of the gene out forever and ever and ever.

I don't know. Is that possible?

DR. LEONARD: Brad, can I distinguish between drugs, which have patent protection, and the gene sequences, which also have patent protection?

With a drug, you are patenting a chemical compound that reacts in some way in the body to prevent or treat a disease, or change how something works. You are not patenting how that something in the body works. So anyone who wants to create a different chemical to treat that same disease can do so. They just can't create the same chemical, and produce and make it.

With gene patents, you are really patenting. Some of these patent the sequence any way whatsoever you can imagine under the sun of looking at that sequence, or detecting in someone's body, or in a specimen, or anything. So it is like patenting the disease rather than the chemical compound that treats that disease. There is really a fundamental difference between drug patents and these gene patents.

DR. TUCKSON: Thank you for that clarification.

Hunt?

DR. WILLARD: Just before I get to David on that point, of course there are patents. It depends on how sweeping the claims are. There are claims that are broad enough to capture an entire biochemical pathway, regardless of the particular drug.

But to David, is your committee, if you can say, also looking at the concept of defensive patents and depositing rights into sort of a scientific commons for every man's use? Or is that something that is off line from what you're looking at?

DR. KORN: I believe that they certainly are going to have ? - there has been conversation about defensive patents. Certainly they are aware, very aware of the initiatives like the Bermuda rules on the human genome sequence, and the SNP Consortium which is an industry, largely an industry consortium. The HAPMAP project, they are very aware, and they are aware of Helen Berman's protein structure bank.

Please be aware that if there is an issue here worth your attention, that it is not business versus academic or commerce versus university, because I believe that the largest holder of human genome sequence patents in the United States is the University of California System.

So this is not universities are good guys and businesses are bad guys. Not at all. This has nothing to do with whether you are a university or a start up, or a major pharma company. It is an issue of, well, to me it is an issue of is it in the interest of the health of the public to proceed along this kind of pathway or not?

I think you all have plenty of capacity to debate that problem. As I say, France and Canada at least have decided it is not in the interest of the health of their people to recognize such a sweeping, exclusive patent.

DR. TUCKSON: We've got three people in line. One is the aforementioned person from the University of California System, Ed McCabe. Then we have Debra, and then Tim.

DR. McCABE: Well, I take full responsibility for everything that occurs in the University of California System.

I was following up. You talked about some of the different issues with exclusive licensure. One of the areas that the American College of Medical Genetics discussed in their statement also had to do with education.

If there are patents on methods or processes that are exclusive, then it is hard to educate the next generation of young people regarding how to utilize those. By the time they go off patent, we could lose the expertise.

I'm not asking for a conclusion, I'm just wondering if the committee is taking this up.

DR. KORN: I don't know the answer to that, or I can't remember whether it has come up or not. Debra Leonard presented to the committee at its most recent meeting a few weeks ago. I don't remember whether you mentioned training.

DR. LEONARD: David, is there any way that this committee could help your committee, is there anything that we can do to inform the committee or, you know, anything?

DR. KORN: It seems to me that your charge is the health, genetics health in society, isn't it? It seems to me that you might, if you choose, to put more energy into the issue of how these sorts of intellectual property rights should be managed to make sure that the health of the public, which is your responsibility, is maximized, or certainly not impaired.

How you would do that and what recommendation you might make about it, I don't know. It seems to me that that would be very squarely within your charge. As I say, I'm a capitalist, you know, I mean, I'm a product of a capitalist society. I'm not really trying to undermine our economy, as I have been accused of doing by some.

I do think it is a genuine issue here of what is best for the future health of the public. If this is the best way to do it, then that's fine. If it isn't, then maybe there needs to be some modification.

DR. TUCKSON: Just as an amendment, David, to the answer you gave Debra. Do you think from your sense of what your committee is going to produce, that our attending to the charge you just sort of recommended for us should wait before we look at that until your committee finishes its work?

DR. KORN: I think as a Secretary's advisory committee, you are free to do whatever you like, when you wish.

DR. TUCKSON: Let me rephrase that.

(Laughter.)

DR. TUCKSON: We love that freedom. I guess I'm just sort of wondering, from your sense, do you think that your committee will introduce information that will be useful to us in undertaking that?

DR. KORN: I don't think I can answer that. I don't know.

DR. TUCKSON: Thank you.

Tim?

MR. LESHAN: I just wanted to say as the liaison from the NIH, thank you, Dr. Korn, and the committee for the work that you are doing on this. It is such an important issue to everything that we are doing at the Genome Institute, and at the NIH in general.

I wondered if you might talk a little bit about some of the difficulty of gathering data to assess the impact that patents are having on genetics, genomics, and proteomics research.

DR. KORN: Yes, thank you for that, Tim.

It is very hard to do this. Apparently, I mean, what you are dealing with are anecdotes rather than data in many instances. That is why I mentioned the golden rice example as one that is not an anecdote, because it was actually described in a Science magazine policy forum a year ago.

Any national academy committee feels it important, and it is very understandably so, that their recommendations and conclusions, conclusions and recommendations, be data supported. Supported by data, driven by data, not by hearsay. Any academy committee.

I think that the committee is very interested in obtaining good, credible data that would shed light on some of these hypothetical concerns. It seems to be, this is not my field, of course, but it seems to be very, very hard to do so.

Certainly within the timeline of the committee's remit, it is certainly not possible to do a thorough three-year study, or something of this sort, to canvas the universe. But they are very interested in obtaining data that would help them to understand, and then think about what they might recommend on these issues.

I will offer another personal observation, however. Many industries have, and I wish there were a good patent lawyer in the room. But many industries have come to the desirability of patent pooling, of developing mechanisms to share their patents so that the whole process of development doesn't get swamped in a mire that nobody can move because everybody owns a bit of what has to be done.

The idea of patent pooling, to my knowledge, in biotechnology or biomedical research and biotechnology, hasn't yet existed. It is not something that comes easy when you talk about biomedical and biotechnology research. For example, I'm told by the experts that patent pooling were essential to the development of aircraft radio, certainly more recently in our lifetimes, in semiconductors. I mean, there is a whole tradition in semiconductors of companies who have bitter competitors, sharing research investments and knowledge at a very fundamental level of the science. I know that.

But in biomedicine, the early capture of discovery, very early capture in the pathway from discovery to some product, the early capture seems to be the name of the game. Of course you have whole biotech companies founded on bits of knowledge. Really early stuff. So there is a tradition of not having a lot of patent pooling.

It may be that in time, if things get mired down enough, that patent pooling will appear to be a very mutually beneficial way for everybody to go, where they put all their patents in a pool on agreeable ground rules and people can use that patent pool to move the field further on.

It doesn't, to my knowledge, and I may be wrong, it just doesn't seem to be something that comes natural to our particular area of work.

DR. TUCKSON: Well, we are right on schedule. But I want the committee to make sure that if we take ? - if there is one further burning question, to take good advantage of David Korn.

MR. MARGUS: I need to make a comment. Just so you know, today is my last day on this committee, so I've been dying to make a comment that would be a little more inflammatory. So here it goes.

(Laughter.)

MR. MARGUS: I'll preface it by reminding everyone that I'm extremely conflicted and biased in this comment. I'm conflicted because first, I run a company that isn't a gene-finding business. I'm also conflicted because I spent a lot of years trying to find a gene for my kid's disease that was an obscure, rare disease, and it was really hard to find anybody that would work on it.

So for all those reasons, I guess the only thing I would like to encourage the patent process reviewing committee, is that to not forget that the race to find the genes could really be important. Even if it seems like we're sometimes overwhelmed and flooded with so much information and we've got enough to work on for now, I think that continuing to encourage those gene discoveries, and there are a lot more to be discovered, is critical to accelerating and focusing biomedical research.

So I absolutely agree that if someone came along who found a replicated, true association between polymorphism and a phenotype of importance and they didn't make a test available to the world so people were being deprived, and maybe the government should have some march-in rights, or maybe the patent line should be made shorter.

But at the same time, you know, from the biotech industry, as you know, there is a need to find investors. Those investors only fund expensive projects to find genes if there is some kind of exclusivity or clinical monopoly that's possible. That's the hot button for every investor.

So on the one hand, we want to protect people from not having an important test, but on the other hand, I would hate to hear that one was done where suddenly there is not enough interest in continuing to find genes. I know the NIH has a lot of funding, but does not have enough funding for all the work that could be done in genetics.

DR. KORN: I absolutely share your view. I certainly would wish to do nothing ever myself that would shut down incentive to find genes. But I just would say there are ways that that incentive could remain, and there still could be more freedom of applicability of the discovery through compulsory licensing schemes.

I'm not recommending these, but they are just things that when he has talked about compulsory licensing schemes, the royalties that are not so punitive that nobody in their right mind could possibly make it work, or other things like that.

I mean, I think there is a middle ground, and I just don't know whether total exclusivity ? - by the way, I want to raise one thing. The recent Canavan decision in the Florida Federal Court that said that the families who had done so much to isolate the Canavan gene had no rights really in any of the resulting patent revenues and so forth, has led other groups, such as the pseudoxanthoma elasticum, PXE, group to form their own way of dealing with that, where they have created a not for profit foundation, I guess.

They are going to control the goods, the specimens, the tissues, whatever. They are going to hold the intellectual property, and they are going to have a voice. What happens if genes are discovered that are of use clinically? They are not discouraging invention, but they are going to have a say in how the fruits of the inventions are distributed among the people.

That's not a bad idea, that's not a bad way to go. There are other such diseases groups that have formed similar controlled mechanisms to keep a hand on what happens to the stuff that they are promoting.

DR. LEONARD: And given the coverage and reimbursement issue that we were discussing earlier for genetic testing, it is so inadequate that I can't believe that it is a really strong business model for a lot of gene diseases or genetic diseases. Rather, I think that your investors would be more interested in what drugs you could develop, or even test kits and other things that have true market potential.

MR. MARGUS: So when we discuss clinical theranostics in the next session, pharmacogenomics, we'll hear how they are all tied together.

DR. TUCKSON: Well, let me thank you all for this.

Brad, you'll have further opportunities in the coming minutes to be provocative.

(Laughter.)

DR. TUCKSON: But let me thank David Korn, who did a terrific job. Thank you, David.

David, would you remind us again? Your report, I couldn't remember the date in which you think this thing is going to be submitted. I think it was June? June, 2005.

DR. KORN: June.

May I do one of those sales pitches? In December of 2002, we (inaudible) special issue of academic medicine that really presents a very new bias (inaudible) gene patenting issues. I know we gave Sarah a bunch of

DR. TUCKSON: And we passed it. The committee actually has gotten a copy of it.

DR. KORN: If anybody wants more, let me know.

DR. TUCKSON: Okay, David. Thank you.

Let me, as far as this issue is concerned on our plate of activities, can I get a general consensus from the committee that we will revisit this issue upon the completion of the NAS committee report in June? And that we feel like they are moving forward, although, you know, we've got a lot to see in terms of what actually comes out.

But you can't find a more stellar committee working more assiduously and rapidly to get a conclusion done. So I think we would be well served by waiting for that. Does anyone disagree with that?

(No response.)