IN THE SUPERIOR COURT OF THE STATE OF ARIZONA
IN AND FOR THE COUNTY OF MARICOPA

RAUL ZENDEJAS and ARACELI ZENDEJAS, Plaintiffs	)
vs.	) NO. CV-2007-005399
SHELL OIL COMPANY, SHELL CHEMICAL LP, Individually and as Successor-in-interest to SHELL CHEMICAL CORPORATION; CONOCOPHILLIPS COMPANY, VON VERDE CITRUS PACKING HOUSE, INC., an Arizona corporation; VON VERDE HARVESTING, INC., a dissolved Arizona corporation; and VON VERDE CITRUS GROWERS COOPERATIVE, INC., a dissolved Arizona Corporation, Defendants.	)

ORAL VIDEOTAPED DEPOSITION
ETHAN NATELSON, M.D.
September 25, 2009

ORAL VIDEOTAPED DEPOSITION OF ETHAN NATELSON, M.D., produced as a witness at the instance of the Plaintiffs and duly sworn, was taken in the above-styled and numbered cause on September 25, 2009, from 10:20 a.m. to 3:48 p.m., before Kelly Hanna, Certified Shorthand Reporter, in and for the State of Texas, reported by computerized stenotype machine at the offices of Haynes and Boone, LLP, One Houston Center, 1221 McKinney

Street, Suite 2100, Houston, Texas, pursuant to the Texas Rules of Civil Procedure and the provisions stated on the record or attached hereto.

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ALSO PRESENT:

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Dory Michael, Videographer
Justin Shrader

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THE VIDEOGRAPHER: Now beginning this deposition. The date is September 25th, 2009. Approximate time is 10:20. We're now on the video record.

ETHAN NATELSON, M.D.,

having been first duly sworn, testified as follows:

EXAMINATION

Q. (BY MR. PATTON) Please introduce yourself for the record.

A. My name is Ethan Natelson.

Q. Dr. Natelson, do you understand my name is Keith Patton, and I represent Raul Zendejas in a case pending in Phoenix, Arizona? Do you understand that?

A. Yes.

Q. And do you understand that even though we're in a conference room today in Houston your testimony is just as if it were in front of a judge and a jury?

Do you understand that?

A. Yes.

Q. You've given depositions before, correct?

A. Yes.

Q. And you have had the opportunity to meet with Shell's lawyer before we started today, correct?

A. Correct.

Q. And what kind of doctor are you?
A. I'm a hematologist.
Q. And did Shell hire you to give you -- or to give opinions in this case?
A. Yes.
Q. And what did they ask you -- what did they want from you as an expert in terms of your opinions?
A. Well, I believe I was contacted in 2007 by Mr. Perry and he said something to the effect that it was a patient with an unusual diagnosis and he wanted me to review the case and comment about the allegations.
Q. And was there any certain conclusion that you were supposed to reach, as opposed to just commenting on the -- on the disease or the allegations?
A. No, I wasn't told what to conclude.
Q. Okay. You have formed opinions in this case; and you put them in a report; is that right?
A. Yes.
Q. Okay. We're going to go through that in some more detail here this morning. But what year did you start practicing medicine?
A. Well, I finished my internship in 1966. So, theoretically, I became a real doctor in -- in 1966. And that's when I was seeing patients as part of a residency program.

I then went into the service in around 1970 for two years; and when I came back from the service, I would say I was in full-time practice. That would be around, let's say, 1970, '71, somewhere in there.

Q. You've been practicing medicine over 40 years?

A. Yes.

Q. And do you currently practice here in the Houston area?

A. Yes.

Q. Where at in the Houston area?

A. The Methodist Hospital.

Q. Okay. And that's here in the Texas Gulf Coast, correct?

A. In the Texas Medical Center, yes.

Q. Okay. Have you ever diagnosed anyone with myeloid leukemia?

A. Yes.

Q. Okay. Have you ever treated anyone with myeloid leukemia?

A. Yes.

Q. Have you ever diagnosed anyone with atypical CML or MDS or AML?

A. Yes.

Q. Do you regular -- regularly see patients who

have those forms of leukemia?

A. Yes.

Q. Okay. Sir, you're familiar with benzene, correct?

A. Yes.

Q. And is benzene capable of causing any diseases?

MR. PERRY: Object to form.

A. Yes.

Q. (BY MR. PATTON) And what diseases does it cause? What body parts does it affect?

A. Well, from the hematologic standpoint, benzene is known to cause aplastic anemia, which is bone marrow failure. It may cause certain forms of myelodysplasia, which are various forms of marrow damage where the bone marrow isn't necessarily aplastic; and it may cause acute myeloid leukemia.

Q. Benzene's target organ, so to speak, is the bone marrow. Is that a fair statement?

A. Yes.

Q. I mean, if benzene is going to make someone sick, it's going to hit their fingernails or their nose or their eyes. It's going to hit their bone marrow, right?

A. Well, acute large exposures might have other effects; but in terms of the chronic, long-term effects,

it would be hematologic.

Q. Okay. And is -- is acute -- or I'm sorry -- atypical CML, is that a myelogenous disease?

A. It is a disease of the myeloid cells, yes.

Q. Okay. Is myelodysplastic syndrome, or MDS, is that a disease of the myeloid cells?

A. Yes.

Q. AMS, is that a disease of the myeloid cells?

A. Yes.

Q. CML, is that a disease of the myeloid cells?

A. Yes.

Q. Okay. Doctor, I'm going to hand you what we've marked as Exhibit 8; and what I would like to do is make a chart of the -- of the myeloid leukemias, if we -- if we could. If you could write "Myeloid Leukemias" at the top.

A. (Witness complies.)

Q. And, again, those are diseases where the myeloid cells are affected, correct?

A. Yes.

Q. It's a leukemia or a leukemia-type condition. Fair statement?

A. Yes.

Q. Okay. Is AML a myeloid leukemia?

A. Yes.

Q. Okay. Can we write that on there?
A. (Witness complies.)
Q. MDS, is that also a myeloid disease or a myeloid leukemia?
A. It isn't a leukemia. It's a -- it's a myeloid illness.
Q. Okay. Can we write "MDS" on there and put "myeloid illness" next to it?
A. Okay.
Q. I just want to have this chart as we -- we go through some of the studies and talk about this later.
And then there is atypical CML. Is that a myeloid leukemia or a myeloid illness?
A. It's a myeloid illness, yes.
Q. Okay. Let's put that on the list, too.
A. Okay.
Q. CML, is that a myeloid illness?
A. Yes.
Q. Okay. Let's put that kind of next to atypical CML, if you've got a little room over there.
A. (Witness complies.)
Q. Okay. There are subtypes of some of these diseases, these four disease groups that you've put on the chart, correct?
A. Yes.

Q. MDS, myeloid -- myelodysplastic syndrome, that has a number of subtypes, right?

A. Yes.

Q. Okay. Can you tell us what those subtypes are and write down their abbreviations under the MDS list?

A. Well, that list has changed. In other words, MDS, the original proposal was put forth around 1982; and prior to that time, we called MDS preleukemic states as a general category.

In -- in 1982, Dr. Bennett, I believe, proposed the original classification, which was used for a number of years; and in that original -- I'll just put "original classification," he put in that classification what we call refractory -- primary refractory anemia.

Q. RA or PRA?

A. Yes.

Q. Okay. What else?

A. We put in refractory anemia with ringed sideroblasts, RARS.

Q. Okay. And that's -- again, that's just a different presentation of MDS, correct? A different subtype?

A. It's a different subtype -- well, it's a different disease than the first one; and what Dr. Bennett did was put these diseases together in a

classification because they had certain similarities.

Q. And the purpose, Doctor, if I'm correct from what I've learned in this case, with our expert, Dr. Gore, the purpose of subdividing MDS is for treatment purposes, isn't it?

MR. PERRY: Object to form.

Q. (BY MR. PATTON) Or is it?

A. No, I wouldn't say that that's so. People -- some people are what are called lumpers. Some people are splitters. People have a passion for classification. And there are certain usefulnesses to a classification. One might be from an epidemiologic standpoint. One might be from an outcome standpoint. One might be from a therapy standpoint, a causation standpoint. There really would be many reasons why one would like to classify an illness.

Q. Okay.

A. But I would say treatment would be only maybe one small aspect of that.

Q. Before we finish your list, are you a lumper; or are you a splitter?

A. I -- I like to be specific as to what the -- as specific as one can be in terms of disease causation.

Q. Okay.

A. So, in other words, instead of saying

hepatitis, I'd like to know if it's hepatitis B or C or what it is. I -- I'd like the disease to be as specific as possible.

Q. So, you're a splitter; so it helps in your analysis of causation; is that right?

A. Yes, it helps -- I think it helps in the analysis of causation. It certainly helps in the analysis of results of treatment and epidemiology.

Q. Okay. And as well as outcome and therapy -- therapy meaning therapy/treatment, those are some of the reasons that you, as a -- as a hematologist, like to split?

A. Yes.

Q. Okay. Let's keep going with our list.

A. Okay. We had primary refractory anemia. We had refractory anemia with ringed sideroblasts. We had chronic myelomonocytic leukemia, or CMML.

Q. There's two Ms in that type of MDS, right? CMML --

A. Yes.

Q. -- as compared to CML?

A. Yes.

Q. Okay.

A. Right.

And we had refractory anemia with excess

blasts, and then we had refractory anemia with excess blasts in transformation.

Q. Transforming to what?

A. AML.

Q. Okay. So, that's to say that someone could have a form of MDS, that it would go ahead and kind of move them from one column to the chart to another. They might go from MDS to AML, correct?

A. Well, yes. All of these illnesses in this category can move within the classification; and they can move out of the classification, if they become acute myeloid leukemia.

Q. It's kind of an evolving disease. It's not like swine flu where you say, okay, you have swine flu. That's it. Someone could have a form of leukemia and, then it moves into another form depending on how the disease progresses. Fair statement?

A. Yes.

Q. Okay. Are we done with the list yet?

A. That was the primary list. I'm thinking if I've left anything out. I think those were the original designations.

Q. Okay.

A. And then it became modified. It's been modified several times. And CMML, which is really a

myeloproliferative disease, was taken out of this. CMML had been a long-standing stand-alone illness for many, many years before it was put into this category; and then it was taken out of the category as a separate free-standing disease.

Q. But is it still a myeloid disease?

A. It is a myeloid disease, yes.

Q. Okay.

A. But it was taken out of the category of myelodysplasia.

Q. So, you want to call it MPD; is that right?

A. It's a form of myeloproliferative disease, yes.

Q. Okay. Should we make a note on the chart of that?

A. Okay. You can call it myeloproliferative disease. Okay.

Q. I don't want to cut off your explanations. So, you can continue.

A. No, no, no, that's -- that's fine. In other words, most hematologists always felt that it should not have been in this classification because it is a myeloproliferative disease; and eventually those pleas were heard and it was paroled from this classification.

Then what's happened is that the splitters came along.

Q. Including you.

A. No, well, I'm -- I'm a casual observer.

Q. Okay.

A. But sort of splitters within the classification, you might say; and they took -- primary refractory anemia stayed there. Then they took RARS and tried to divide it into a number of categories. So-called pure RARS and -- let's just say pure -- RARS with multilineage dysplasia, meaning that the morphology was very aberrant in one set by the other.

Q. "Aberrant," that's a new word to me.

A. Meaning that it was further away from normal. In other words, in classic RARS, there are certain particular abnormalities; and they're primarily in the red cell precursors in the bone marrow. You see some where the white cell precursors are abnormal and the platelet precursors are abnormal, and that's referred to as multilineage dysplasia, three different lines being affected. And some people felt there was importance to segregate those -- those lines, that is to say, because it seemed that the people with pure RARS had a better prognosis than those with the multilineage dysplasia.

Now, it could be that simply you're looking at the two ends of a bell-shaped curve and that there really is one illness, but nevertheless, they were

separated out into these two categories where they stand now.

And I might go back, by the way, I just remembered, that in the original classification, there was sort of a myelodysplasia unclassified, a U; and that is, it didn't fit into any of these categories.

Q. Okay.

A. That's still in the newer ones, myelodysplasia U.

Then what happened was -- is that the refractory anemia with excess blasts and transformation disappeared because it was decided that really that was acute leukemia and it was -- it already was acute leukemia. And what had happened was we used to have a rule that you had to have 30 percent blasts, myeloblasts, to make a diagnosis of AML. Then that number went down to 20 percent. Well, when that went down to 20 percent, a lot of these refractory anemias with excess blasts and transformation fit into the AML category.

Q. So, each of the diseases on Exhibit 8, the chart you're making for us, those are all -- they all have the potential to progress to AML, correct?

A. Yes. All diseases in the myelodysplasia category have the potential to progress to AML at

different incidence rates.

Q. But then if you have someone with RAEB in transformation with -- that has the little t next to it --

A. Yes.

Q. -- that's to say, you already know that that's going to become AML?

A. Yes. Now, before, it was considered that wasn't quite AML but now it's considered it is AML.

Q. Okay.

A. Okay? And -- and actually, we've even gone further than that, because in certain forms of AML, you don't even have to have 20 percent blasts anymore to make that diagnosis. In other words, today, if you see a person with a particular chromosome aberration, such as inversion 16, or 15 to 17, translocation that causes promyelocytic leukemia, even though you may have, let's say, 5 percent blasts, by definition, that becomes an acute leukemia, an acute myeloid leukemia, without the 20 percent blast number. So, there's been a continued evolution of what we actually call acute leukemia.

In any event, getting back to your table here, we -- what's further happened is now, going back to this RARS category, there's been a further subset taken out of this one because some of these patients

with RARS have very high platelet counts. That's been known for many years. And in recent years it's been shown that that particular group often has an unusual chromosome aberration called the JAK2.

Q. And a chromosome -- a chromosome aberration is where there's a notable or marked problem with a specific chromosome?

A. Well, it may be a duplication of a particular area on the chromosome, a very tiny defect. It may be loss of part of a chromosome. It may be loss of a whole chromosome. It may be an extra chromosome. There are many kinds of aberrations that can occur. It could be a translocation where a piece of one chromosome moves to a different one in exchange for that chromosome's piece, a so-called reciprocal translocation.

In any event, so, now -- now you could say the RARS category has been split out into pure, multilineage dysplasia and -- and those that have this JAK2 aberration so that -- that one category might become three.

We still have refractory anemia with excess blasts; and that's been divided into two categories, sort of a 1 and 2, depending on how many blasts you have.

And then there is a -- another category of

just myelodysplasia with multilineage dysplasia, meaning that all three cell lines are -- are affected and that's the general -- I think I've covered most of the ones on the current transformation. These are very fluid, and every so often they are modified a bit.

Q. Okay. That -- that bottom half of the page, is there a year where those became the new criteria or the new names, so to speak?

A. I can't tell you the exact year. For example, the removal of the RARS because of the JAK2, that's actually proposed. It's been proposed for about two years. I don't know if it currently has been accepted. These are sort of -- it's peculiar how these changes come about. They're often done by the World Health Organization, who are primarily pathologists; and -- and those of us that are clinicians look at this, and it's only been in recent years that the WHO now has a few clinicians on their board.

But most of these designations are pathologic designations. In other words, the pathologists looking at the bone marrow and thinking that they can make separations. And what happens is that as many people have commented and as pointed out in some of the articles that I have there, you can give many of these slides to different pathologists; and they

might be put into different slots. There's a lot of -- a lot of interpreter variation when you're talking about pure morphology.

Q. So, there's interpreter variation among splitters --

A. That's correct.

Q. -- in the hematology and the pathology communities?

A. That's correct. You might look, for example, I saw one report where, just in terms of this refractory anemia with ringed sideroblasts, one large institution, virtually all of their patients were in the RARS category. A second institution, virtually all of their patients were in the multilineage dysplasia category when they had ringed sideroblasts. And they really ought to be the same. These are both large studies.

So, it looked like the pathologists at one institution were more likely to use the term "multilineage dysplasia" than those at the former institution.

And, again, there's a lot of, I think, interpreter variation in these issues.

Q. Fair enough. I didn't mean to cut you off.

A. No, no, I -- as I say, that's -- that's where we are today. In other words, it's a -- it's a category

that -- that is -- continues in evolution.

Q. Fair enough. AML --

A. Yes.

Q. -- can we subdivide AML?

A. Yes. AML formerly has been subdivided into what we call the FAB classification.

Q. Is that the M1 to -- through M6?

A. Yeah, or M7. And the -- that was purely based on, let's say, morphology, the so-called French-American-British classification. That actually has become passè. It is still used and some textbooks still use it but the World Health Organization has dropped it.

Q. So, that's to say that you don't call AMLs by an M1 or an M4 subtype anymore?

A. Some people do. Some people don't. As I say, that's, again, a state in transmission -- in -- in change. For example, if I saw a person with what's called M3 promyelocytic leukemia, some people would call it M3. Some people would call it promyelocytic leukemia. The World Health Organization would call it 15 to 17 translocation leukemia because you have to have that translocation to get into the game.

Q. Got you.

A. And, so, what the World Health Organization has

been trying to do in recent years is to pigeonhole these myeloid disorders into categories that have a very specific molecular or -- or biochemical marker that -- that, let's say, proves their existence, as opposed to others that don't have that.

Q. So, can we make -- to subdivide AML in sort of a simple way to teach us, can we -- can we -- is it still fair to write down those M1 through M6?

A. Yes, you can. In other words, there's actually M0 --

Q. Okay.

A. -- meaning very poor differentiation; M1; M2. M3 is the promyelocytic. M4 is -- is, I believe, myelomonocytic. And M5 is pure monocytic. M6 is erythroleukemia. M7, I believe, is megakaryocytic leukemia. They're sort of morphologic variations of AML.

Q. So, within each one of those -- let's take M2, for example. Not all M2 patients are the same, correct? Some of them might have other sort of individual things about their disease that make them particular --

A. Yes. The classification is simply how close do these blasts look compared to the normal cell? In other words, are they -- normal myeloid cells have granules in them. Are these cells devoid of granules? Are there a

few granules? Are there aberrant granules? For example, in M4 AML, some have very aberrant-looking red or eosinophilic granules. Sometimes that's associated with a particular chromosome defect called inversion 16, sometimes not.

And, so, by looking at the morphology, which doesn't necessarily correlate directly with chromosome aberrations except, for example, in M3, you come to a conclusion which category it goes into.

Q. But you could even subdivide a little more if you really wanted?

A. Yes. And that's what's happening now, is by eliminating these categories of M numbers, you're trying to separate them by some particular molecular marker.

Q. Fair enough.

With the atypical CML, can we subdivide that anymore?

A. No. Atypical CML originally was simply called Philadelphia chromosome negative CML. And then when we came up -- and there were -- if we looked at all CMLs, there were a certain number that fit into that camp where they couldn't be morphologically distinguished from CML with the Philadelphia chromosome. They were just Philadelphia chromosome negative CML.

Then things got a little further

subdivided, because we found that some of those people that were Philadelphia chromosome negative, they had a protein in their blood called the Bcr protein that's produced by the Philadelphia chromosome. And even though you couldn't see the chromosome, it was there because it was making this marker. So, then, in order to become Philadelphia chromosome negative, you also had to be negative for the Bcr locus.

And then people came up -- the World Health Organization, their being purists, they wanted CML to be only used for people with the Philadelphia chromosome; and anything else, we've got to find someplace to stick it. We don't -- we don't want it called CML.

The M.D. Anderson group said, "Okay, we'll call it atypical CML." And that seems to -- it's still smoldering, but that seems to be an accepted designation now, that atypical CML is a disease that morphologically is indistinguishable from classic CML except it doesn't have the Philadelphia chromosome.

Q. So, do we subdivide the CML anymore?

A. Well, CML --

Q. Regular CML, not atypical.

A. Regular CML -- no, it's -- it's the disease characterized by the -- by either the Philadelphia

chromosome or the positive Bcr product and that's the disease that has been, you might say, a miracle, because when I first went into practice, 100 percent of these people would die and then a number were saved by bone marrow transplants and today 90 percent take a pill a day and do fine.

Q. Is it -- I'm sorry.

A. No, I was going to say --

Q. Isn't that what happened to Raul Zendejas? He had atypical CML. Back in the day, he would have died. Here he was given a bone marrow transplant. He survived.

A. That's correct.

Q. Okay. I think we've covered the chart, do you?

A. Yes, in general, that's right, yes.

Q. Okay. You've brought up some things that I want to talk about in a little more detail and then we'll kind of move on to a new topic.

You mentioned cell lines. There -- there are three cell lines within the bone marrow. It's my understanding the bone marrow's function, it's sort of like a -- it's a factory for white cells, red cells and platelets; is that right?

A. In general, yes. There are also lymphoid cells in the bone marrow. And plasma cells. There are a

variety of lymphoid cells.

Q. The bone marrow produces red blood cells. Those carry oxygen to our body; is that right?

A. Yes.

Q. And you need the oxygen in your body for energy, right?

A. Yes.

Q. And then the white cells, those help fight immunity, correct?

A. Well --

Q. Or they help immunity functions?

A. Yeah, in two -- two different ways. The so-called myeloid white cells, the granulocytes, neutrophils, monocytes, they directly phagocytize and kill bacteria. So, they're primarily antibacterial and antifungal to a certain degree; whereas, the lymphoid cells are more immune mediated, making your antibodies to viral diseases, other diseases of that nature.

Q. And then our platelets, those help our blood clot if we have a scrape or a cut or even something internally; is that right?

A. Yes. The platelets come from the parent cell in the marrow, which is called a megakaryocyte.

Q. Generally speaking, is it fair to say that a myeloid leukemia or a myeloid disease causes or involves

some type of -- of screw-up with the process of one of those -- one or more cell lines. Is that a fair statement?

A. Yes.

Q. That's to say there's some damage in the bone marrow that is manifesting itself by either moving your white counts higher or lower or your red counts higher or lower or messing up your platelet numbers. Is that a fair description?

A. Yes. It interferes with the -- with the mechanics of cell production, AML does.

Q. All the -- all of the myeloid --

A. All of these myeloid diseases do, yes.

Q. Okay. If benzene -- before we made your chart -- if benzene is going to hurt someone, it's going to hurt their myeloid cells. It's going to hurt their bone marrow, correct?

MR. PERRY: Object to form.

A. Well, it's going to hurt -- it can hurt all of the cells, including the lymphoid cells, because in aplastic anemia, the lymphocytes often disappear first. And, so, it's not just the myeloid cells. It's lymphoid cells that may be damaged by benzene, in the case of aplastic anemia.

Q. (BY MR. PATTON) For -- I want to kind of move

to a new topic here. You practice here in the Texas Gulf Coast; is that correct?

A. Yes.

Q. Is -- how long have you been practicing here?

A. Well, except for two years in San Antonio when I was in the service, I've been here since I came here to go to medical school in 1962. Long time.

Q. Over 35 years?

A. Yeah, more than that, actually, but a long time.

Q. Okay. Do you -- have you been treating patients with myeloid leukemias or myeloid diseases throughout that time here in the Texas Gulf Coast?

A. Yes, since I was actually an intern seeing patients; and I at that time saw a number of patients with myeloid leukemias. So, since 1966 and including the years I was in the service because I was assigned to the referral hospital for hematology in the Air Force. So, I exclusively saw hematology cases during those two years I was in the Air Force. So, I've been seeing various forms of leukemias and myeloid, lymphoid diseases since 1966.

Q. Would you agree with me that there is a really, really large concentration of oil refineries and petrochemical facilities here in the Texas Gulf Coast?

A. Yes.
Q. And would you agree with me that the primary function of some of those refineries is to make gasoline?
A. I assume that's correct. I don't know what percentage or how that works. I'm not a refinery person, but I -- I can't disagree with that.
Q. You just know in your general life experience that they're making a lot of gasoline here in the Houston area?
MR. PERRY: Object to form.
A. I'm sure that that's so, but I couldn't quantitate that in any way.
Q. (BY MR. PATTON) Sure. Sure. If we go to Phoenix, they're not really making a lot of gasoline there?
MR. PERRY: Object to form.
A. I don't know that for a fact, but that would seem reasonable.
Q. (BY MR. PATTON) Do you have any appreciation of how much gasoline is produced at the refineries here in the Texas Gulf Coast area?
A. No.
Q. Okay. Do you know if benzene is a component of gasoline?

A. Well, there is -- there is benzene in gasolines and -- and fuels, yes.

Q. Do you -- do you have any understanding of what the generally accepted causes of myeloid leukemias, all those diseases on your chart there, what are the -- the possible causes of myeloid leukemias?

MR. PERRY: Object to form.

A. Well, the largest category, of course, of myeloid leukemias -- and you have to subdivide them into type. Let's take AML, for example. The vast majority of AML is what we call de novo disease. And we don't know the causation. And it may even be endogenous from normal cell subdivisions, that somehow because they're so enormous in -- in their attempt to maintain normal blood counts, that mistakes may happen.

So, some people would say de novo leukemia or primary leukemia or endogenous leukemia, that would account for, perhaps, 85 to 90 percent of the leukemias that we see, acute myeloid leukemias.

Then there are a number of other known causes --

Q. (BY MR. PATTON) Let me stop you real quick and talk about some of these --

A. Yes.

Q. -- before we move to the other ones.

De novo, that's to say, we just don't know the cause, right?

MR. PERRY: Object to form.

A. No, not necessarily. That is true, that we don't know the cause; but it describes a leukemia that has certain particular characteristics. For example, favored chromosome abnormalities; certain clinical course; depending on the chromosome aberration; certain age designations, again, depending on the certain chromosome aberrations; certain racial differences. For example, promyelocytic leukemia, M3, is more common in Hispanics than it is in Caucasians. There would be a variety of things that would go into making a diagnosis of de novo leukemia but -- but it is true. We don't have a identifiable external cause for that illness.

Q. (BY MR. PATTON) Some patients come in. They get diagnosed with a certain form of leukemia, and for one reason or another you can't isolate the cause. You call it de novo. Is that fair?

A. That's -- that's part of the issue, yes.

Q. And what's the -- what was it about M3 in Hispanics?

A. Well, it's been noticed -- Dr. Tallman, actually who lectured at Methodist just last week, is one of the people who noticed this, that when you look

at -- at communities with large Hispanic populations, they have a much higher incidence of promyelocytic leukemia.

Q. AML M3?

A. AML M3.

Q. Does Raul Zendejas have AML M3?

A. No.

Q. Okay. What -- and then endogenous, that's to say your -- your body just kind of makes the change? For instance, my hair might go from dark to gray; and that's just a body change. Is that what endogenous is?

A. No. What endogenous means is that we have a massive amount of white cells in the body. And these white cells don't live very long. And we replace all of these millions of cells at least three times every day. And in order to do that, what has to happen is the chromosomes have to fracture, double and reassemble; and accidents can happen. And we have tremendous reparative mechanisms, but if an accident happens and a translocation may occur or a damage that can't be repaired and for whatever reason that damaged chromosome is favored in terms of its reproduction, we may end up with a leukemia and it's -- it's an endogenous event. There wasn't -- there wasn't a medicine. There wasn't a physical external problem that caused it. It was

something that happened because of the necessity for this massive reproduction of cells that the bone marrow needs to engage in.

Q. All right. We have de novo. We have endogenous, and what are the other recognized causes of myeloid leukemias?

A. Okay. Well, we have certain, let's say, congenital illnesses.

MR. PERRY: Object to form.

Just a second.

Are you talking about AML or myeloid leukemia?

A. AML. I'm still with AML. We have certain congenital illnesses, for example, Down syndrome, trisomy 21, is associated with a high incidence of both acute myeloid and lymphoid leukemia.

Q. (BY MR. PATTON) Did Raul Zendejas have any of those?

A. No.

Q. Okay. And, Doctor, I want to make it clear. I want to talk about generally accepted causes of the whole family of myeloid leukemias.

A. Well, but you have to talk about -- if you want to do that, that's fine; but you have to talk about them individually because they are different.

Q. Fair enough. What else -- what other causes do we have?

A. In the case of acute leukemia, it's interesting that an illness, hereditary illness called pernicious anemia is associated with an increased incidence of AML; and the reason for that is that when you get vitamin B12 deficiency, it interferes with chromosome duplication and you can get chromosome aberrations simply from that vitamin deficiency. And all the studies that have looked at long-term consequences of people with pernicious anemia find a higher incidence of both stomach cancer and AML in that group. So, that would be another risk factor.

Q. Did Raul Zendejas have pernicious anemia?

A. No.

Q. Okay. What are the other causes?

A. What are the other causes? Of course, benzene is a known cause of -- of -- or potential cause of AML, benzene exposure at very high levels. The other incidences are -- are chemotherapy drugs.

Q. Hold on a second. Did Raul Zendejas have occupational exposure to benzene?

A. Well, he worked with gasoline; and I can't comment as to what concentrations of benzene he has. I don't believe he worked with pure benzene. He worked

with gasoline which might have 1 to 2 percent benzene in it. So, indirectly, yes, he's working with benzene.

Q. You agree with me that Raul Zendejas was occupationally exposed to benzene?

MR. PERRY: Object to form.

A. He was occupationally exposed to gasoline, of which benzene is a component.

Q. (BY MR. PATTON) Okay. If someone comes to you -- are you an internal medicine doctor as well?

A. Yes.

Q. I mean, you can teach -- teach -- you can treat patients with colds, fevers, other diseases, correct?

A. Yes.

Q. Okay. If someone comes in and has, let's say diabetes, can that be caused by sugar problems; or how is that?

A. Well, diabetes, that's an illness broken into generally two camps, so-called type 1 and type 2 diabetes, type 2 being -- having a genetic predisposition typically. Type 1 is more of an acute illness that may be viral induced, often happens at an early age and is a more aggressive illness.

Q. But it has something to do with sugar, right?

A. Well, when you get diabetes, you can't handle sugar very well because you're lacking insulin or --

Q. Can you handle -- I'm sorry. I didn't mean to cut you off.

A. Or you have resistance to insulin. The insulin doesn't work very well.

Q. Can you handle Twinkies, if you're a diabetic?

A. Well, you can if you're taking your insulin properly. If you're taking insulin injections. In other words, the objective is to try to control your blood sugar, because we know that if the blood sugar is constantly very high, that predisposes to vascular defect, vision defect, kidney defects and so on.

Q. Twinkies have sugar in them, correct?

A. Yes.

Q. So, if you're a diabetic, you want to be mindful of Twinkies just as you want to be mindful of putting pure sugar in your coffee, correct?

A. Well, you have to -- you have to be -- have a balance between the amount of sugar in your intake and the amount of insulin that you have in the body.

Q. As a doctor, you recognize and respect the role of sugar in foods, as compared to pure sugar, as that might affect diabetes, right?

MR. PERRY: Object to form.

A. I'm not sure I understand that question.

Q. (BY MR. PATTON) I'll move on.

Okay. You said benzene, known or potential cause of myeloid leukemias, correct?

A. Yes.

Q. And then what other causes --

MR. PERRY: You said AML or myeloid?

THE WITNESS: AML.

A. The --

Q. (BY MR. PATTON) Before we move on, do you not believe -- you do not believe that benzene causes MDS; is that correct?

A. No, I do believe benzene can cause certain forms of MDS.

Q. Okay. Well, we just talked about -- your lawyer chimed in and said do you just mean AML and I want to be clear on this.

A. No, we were talking about AML. I thought I was talking just about AML causation.

Q. I want to talk about the myeloid leukemias.

A. I understand. But I would like to do that one at a time.

Q. Okay.

A. In other words, because as I said earlier, there are different causations in these illnesses; and AML is one illness and -- and other things, like CML, they're entirely different illnesses.

Q. Is benzene capable of causing AML?
A. Yes.
Q. Can benzene cause MDS?
A. Certain forms of MDS, yes.
Q. Can benzene cause CML?
A. No.
Q. Can benzene cause atypical CML?
A. No.
Q. Okay. We'll go through those in a little more detail.
You -- you were mentioning the next cause, chemotherapy drugs?
A. Yes. Of what we call secondary leukemias today, and secondary means not endogenous. There is an external event that caused the AML. Many of these, perhaps, oh, 7 to 8 percent of those are caused by prior chemotherapy treatment. For example, we might have a lady with breast cancer and the chemotherapy is successful in treating the breast cancer but causes the development of AML several years later. Or we treat someone for Hodgkin's disease and later on acute leukemia develops. So that chemotherapy and radiation therapy are both known causes of AML.
Q. I'll add radiation right under chemo drugs. Is that fair?

A. Yes.
Q. Okay. So, chemo drugs and radiation, those can affect the myeloid cells, correct?
A. Yes.
Q. Can benzene affect the myeloid cells?
A. Yes.
Q. CML and atypical CML, those are myeloid diseases, correct?
A. Yes.
Q. And your testimony here, just as if it were in front of a judge and a jury, is that benzene, yes, it affects the myeloid cells; but it's not going to affect it in such a way to cause those two diseases. Is that your testimony?
A. That's correct.
Q. Okay. And did we talk about all the causative factors?
A. I think that we didn't talk about other underlying bone marrow diseases. For example, people who have myelodysplasia for whatever reason in most cases myelodysplasia is also a de novo disease but various forms of myelodysplasia may terminate in AML. And, so, an underlying myelodysplasia may -- is a causative factor in AML or can be.
Q. And you have -- that myelodysplasia, that would

essentially fit in on that chart of myeloid diseases, correct?

A. Yes, myelodysplasia would be a myeloid disease.

Q. Okay. And then that can become AML?

A. Yes.

Q. Okay.

A. And then myeloproliferative diseases, those are illnesses like CML or polycythemia vera, myelofibrosis, primary thrombocytosis, chronic myelomonocytic leukemia, all of the myeloproliferative diseases may also terminate in AML at differing incidence rates.

Q. Did Raul Zendejas have any exposure to chemotherapy drugs or radiation?

A. Not that I'm aware of.

Q. And he had some bone marrow disease forms that ultimately became AML; is that accurate?

A. Well, he developed what most people would call a blast crisis. That is, he developed very immature cells in the peripheral blood. And in people with CML or atypical CML, when they go into what we call blast crisis, they make large numbers of very immature cells which can be myeloid or they can be lymphoid. They're usually myeloid, perhaps 80 percent are myeloid. Maybe 20 percent of the time they're lymphoid. And we call that blast crisis. And it simulates acute myeloid

leukemia. And if you wanted to call it acute myeloid leukemia, I wouldn't put up a fuss; but most hematologists would simply refer to it as a blast crisis.

Q. Depending on how much of a splitter or a lumper they are. Is that fair?

A. Yes. You may be seeing myeloblasts or lymphoblasts, which are the characteristics of acute lymphoblastic leukemia or acute myeloblastic leukemia; but the implications of a blast crisis in CML are much different than the implications of acute myeloid leukemia as we know it.

Q. If Dr. Carroll -- you understand Dr. Carroll was Raul's main treating doctor. Do you understand that?

A. Yes.

Q. He gave him two bone marrow transplants; is that right?

A. Yes.

Q. We took Dr. Carroll's deposition. We looked at his records. You looked at both the depo and the records, right?

A. Yes.

Q. He says that Raul has AML, correct?

A. I don't remember that -- that particular

statement. I don't dispute it. I just don't remember that.

Q. All right. Have we called -- have we talked about all the causes of myeloid leukemias?

A. I think we've covered most of them. Let's see. We talked about congenital issues, acquired issues with chemotherapy and underlying diseases, endogenous formation of AML. I think those would be the most -- most predominant causes.

Q. Is smoking a factor in causing myeloid diseases?

A. Yes. Smoking is actually -- I had forgotten that. Smoking -- to add that -- smoking is thought to cause acute -- potentially cause acute myeloid leukemia and certain forms of myelodysplasia.

Q. Did Raul smoke cigarettes?

A. Yes.

Q. Okay. I want to talk a little bit more about these -- this de novo category of possible causative factors of myeloid leukemias. Did you say it's 80 or 90 percent of all myeloid diseases are considered de novo?

A. I said that of acute myeloid leukemia and myelodysplasia about 85 to 90 percent of those diseases are considered de novo diseases.

Q. Isn't part of the reason they're de novo is because no one asked, no one conducted the more in-depth examination to try to figure out other possible causes?

A. No, I don't think that's so.

Q. If someone comes in to your clinic and you diagnose them with a form of myeloid leukemia and you take a patient history, do you do that sometimes with your patients?

A. Yes.

Q. You talk about social history, whether they smoked, what kind of work they did?

A. Yes.

Q. You asked them about hereditary factors, family history of cancer, things like that?

A. Yes.

Q. If they come in and they -- they don't tell you that they had previous chemo drugs and previous radiation treatment, would you call it a de novo leukemia?

A. Well, if I don't have that information, then -- then that's a missing important part of history. And if a person had heavy chemotherapy and came in with acute leukemia, it's more likely to be, depending on the time sequence, the drugs he got and so on, it's very likely to be a secondary AML.

Q. Not a de novo AML?

A. Not a de novo.

Q. So, he comes in; he raises his hand and he waves it around and he says hey, Doc, hey, Doc, I had chemo drugs and I had a lot of radiation, you would automatically -- well, not automatically, but you would draw the conclusion, as a -- as a doctor, you would say, well, probably a cause of your disease. You're no longer in the de novo category?

A. Yes. I would say this, that in no particular case of acute myeloid leukemia can we be certain about causation. In other words, there's no way to look at that slide or that patient and say, aha, this was caused by this and that was caused by that. All we can say is what is probable.

And, so, I would say if somebody came in with a past history within, let's say, the last 10, 15 years of getting high-dose chemotherapy and they came in with acute myeloid leukemia, I'd say it was highly probable that the chemotherapy was -- was -- leukemia was a consequence of the chemotherapy.

Q. But if he just doesn't mention his chemotherapy history, you're not going to say more probable than not that it's chemo drugs. You're going to say, oh, you're de novo, right?

A. That's correct.

Q. So, you would agree with me, Doctor, that part of the reason some 85 percent, give or take, of leukemias or myeloid leukemias are de novo is because nobody asked, right?

MR. PERRY: Object to form.

A. No. Because, you see, you can find plenty of literature to show where people did ask. For example, one of the types of acute myeloid leukemia is called M6, or erythroleukemia; and that's one that benzene can cause. And there's one -- the larger study in the world done on those cases, and I think they had, like, about -- let's just say 70 cases of erythroleukemia, and they sat down with these patients and took very detailed histories and they came up with the fact that 66 of them, I believe, were -- something in that order -- were de novo. They had no history of any sort of exposure. Some had prior history of myelodysplasia; or they took immunosuppressive drugs for transplants; they had some other drug background that might be causative, and they found one person out of that group who gave them a history of heavy exposure to solvents. So, perhaps that one person had his illness from solvent exposure, perhaps he didn't. But there -- there -- we have enough studies like that. So, we know that the bulk of

leukemia is without any obvious external causation.

Q. (BY MR. PATTON) If somebody comes in and you take your social history and their work history, occupational history and they tell you, hey, you know, my mom had pernicious anemia, family history of cancer and I've been smoking. Would you acknowledge those as positive causative factors in their myeloid leukemia?

MR. PERRY: Object to form.

A. Well, in acute myeloid leukemia, for obscure reasons to this point, if your mother had breast cancer, you are at higher risk of AML than the general population. And certainly if you smoke, you're at higher risk of AML than the general population.

Q. (BY MR. PATTON) So, if you know those things, you can acknowledge them as possible causative factors, right?

A. Well, associations. In other words, we -- again, it's, in an individual case, very difficult to give cause and effect. We can just say statistically a son of a woman with breast cancer has a higher incidence of AML. Statistically a smoker has a higher incidence of AML if they're a heavy smoker. Why that's the case, we don't know.

Q. I'm not really asking if there's -- if someone might have a higher incidence. What I'm really asking

is: If somebody walks into your clinic, you diagnose them with a form of leukemia; you take a social history; they tell you, hey, I've had some chemo drugs; or, hey, I've had radiation; or, hey, I've been smoking, before you start digging deeper into the literature, do you acknowledge and respect those -- those issues as possible causative factors of their leukemia?

A. Yes.

Q. Okay. But you don't necessarily go as far to do a full investigation to take them out of the de novo category; or do you?

A. Well, I think our therapy in acute leukemia is based today in part -- and actually in the main -- on chromosome analysis in the patients --

Q. And, Doctor, I don't mean to cut you off; but I'm not asking about chromosomal analysis.

A. I understand. But you're saying -- your question has to do with whether I might base my treatment on the history of whether it's de novo or secondary.

Q. I'm not talking about treatment.

A. Okay.

Q. I'm talking about --

A. You'll have to repeat that question, then.

Q. Okay. Let's -- that's fair. Let's do that.

Someone walks into your clinic, okay?

A. All right.

Q. You diagnose them with a given form of myeloid leukemia, any one on your chart there, okay?

A. Okay.

Q. And they tell you -- you take a social history, and they say, Doc, I've had a bunch of chemotherapy and/or I've had a bunch of radiation for prior cancer treatment. Do you, as a doctor, recognize those -- those earlier exposures to chemo drugs or radiation as possible causative factors of their disease?

MR. PERRY: Object to form.

A. Yes. I think I've already said that.

Q. (BY MR. PATTON) Okay. Somebody comes in to you -- and you work here in Houston, and there's a lot of gasoline being made around us. Someone walks in and says, Doc, I've been working at that refinery for 30 years. We've been making gasoline. Would you acknowledge benzene as a possible cause of their myeloid leukemia?

MR. PERRY: Object to form. Vague. Doesn't specify a type of myeloid leukemia.

Q. (BY MR. PATTON) And, Doctor --

A. Well --

Q. -- I'm asking generally. Okay. They come in

and you figure out, hey, this guy has got some type of myeloid leukemia. The pathology is out there right now. It's going to come back and tell you what specific type. Is that kind of how it works? I mean, you don't first see the patient?

A. Well, usually you first see the patient or, in my particular case -- let me give you a specific example of how it works. This week a doctor had a patient who was deaf and he wants to put in a cochlear implant in his ears to have him hear better. And the man is 72 years old and has never been a sick a day in his life. But like many surgeons do, they get preoperative laboratory work; and lo and behold, his white blood count is 50,000. The normal is 5 to 10,000. So, 50,000 is high. And they're lymphoid cells, at least the lab says that. So, he cancels the surgery; and he refers the patient to me.

Q. Let me stop you right there real quick. That patient comes in and he has a problem with his white cells and he has a problem with his lymphoid cells, right?

A. Yes.

Q. And you can tell that off his standard blood work, right?

A. I can tell the general category of illness off

the standard blood work, yes.

Q. Okay. What is that general category of illness? Is it a myeloid disorder, a myeloid disease?

A. It -- well, it could be if the lab technician is mistaken, because many times what are myeloid cells are mistaken for lymphoid, especially immature cells, and vice-versa. So, at least if -- if the lab were accurate, I would say he would have a lymphoproliferative disease.

Q. Does that fit on our chart?

A. No. We're not -- only in the case of a blast crisis, which can be lymphoid; but we're talking myeloproliferative diseases. But you're talking how it works when you see a patient with leukemia or you're referred, and I'm saying that's a typical example. Someone comes in with a high white count. They come to the hematologist for an evaluation of what is the cause, what's the classification, what's the type of illness and what kind of therapy would be appropriate.

Q. Is part of your job as a hematologist here in the Houston area to determine cause of your patients' diseases?

A. Well, that's part of what we do. In other words, a -- a -- even though a hematologist is not a trained epidemiologist, we always take a history from a

patient; and you might say we have a good understanding of what's likely and what's not likely from our long experience.

For example, if I see a patient with hairy cell leukemia, I know that about 80 percent of them are going to be male because I've been seeing hairy cell leukemia for 40 years and 80 percent are male. I don't need an epidemiologist to tell me that because that's an observation made over time.

Q. Somebody could give you something of a quiz, give you the pathology that says hairy cell leukemia. You don't even need to look at the top to see male or woman. You're saying, hey, probably a male here?

A. It's probably going to be man. And if it's a woman, I'm going to look twice at those slides to be sure that this is not a mistake because that particular illness is a man's disease.

Q. If someone came -- I'm sorry.

A. No. I was going to say, and if somebody referred me an 18-year-old person and said they had multiple myeloma, I'm going to say, tilt, that's an older person's disease. I'm going to look carefully and see could there be some other etiology.

Q. If someone comes in and you see the chart and you see -- and you see that, hey, this person has a form

of myeloid disease, just like one of those on the chart -- you know it's one of those. And you see at the top there worked at a refinery for 30 years making gasoline, are you going to draw the conclusion, hey, benzene probably a factor in this disease?

MR. PERRY: Object to form.

A. Not necessarily. In other words, I'm aware of the general epidemiologic literature and I have a number of papers in there and I know that for many, many years it's been very difficult to demonstrate an excess of myeloid leukemias in refinery workers over what's in the general population. So, just because they work in a refinery doesn't mean that that's the cause of their illness.

Q. (BY MR. PATTON) Well, just because someone had chemotherapy drugs doesn't really mean that's the cause of their illness, does it?

A. That's true. In other words, it's a -- it's a consideration -- but I would -- let's say if I found out that somebody had a total of about 20,000 milligrams of Cytoxan as part of their chemotherapy, that would be a much more of a red flag to me than if a guy said, you know, I work -- I've worked at the refinery down the street for 20 years.

Q. What if it says he worked with a lot of

benzene?

A. Well, I'd say that's -- if that's so, that -- that would be significant, if he was working with pure benzene.

Q. Have you -- and people refer you -- doctors refer you patients all the time, right?

A. Yes.

Q. Have you ever made -- do you have any type of survey form that you give them that says, hey, "yes" or "no," chemotherapy drugs, did you smoke, prior radiation, family history, do you have any type of survey that you perform of your patients?

A. No.

Q. Thirty-five years in the Gulf Coast area, have you ever used such a survey to determine how many of your patients have worked in refineries?

A. No.

Q. Have you ever done any type of survey to see how many of your patients have worked with solvents?

A. No. These are -- I ask all these questions, but I don't -- and I record them in my history and physical, for example, if they smoke and how long and so on, but I haven't gone back to try to do statistics on -- on my patients to see if I have an unusual number of refinery workers with acute myeloid leukemia because

I know that I haven't. In other words, I don't see a patient and he says, I'm just another guy from the Jones refinery down the street; and I say, oh, yeah, here for AML again. It doesn't work like that. I see people from all walks of life.

Q. I understand that, Doctor.

A. And that particular occupation doesn't stand out in my years of practice.

Q. My question is a little different. And I'll ask a new question. Do you -- have you ever -- do you sit in on meetings with others -- isn't there a Gulf Coast Hematology Association or something like that?

A. Yes.

Q. Do you sit on separate boards or separate groups within the hospitals that you treat patients at?

A. Yes.

Q. Have you ever chimed in in one of those meetings and said, hey, you know, benzene can cause these myeloid leukemias. We have people, some of our patients who are working, making gasoline, they're working at refineries. Maybe we should do a study. Have you ever done that?

MR. PERRY: Object to form.

A. I've never made -- I don't recall ever making a suggestion that we should do a benzene study among our

patients.

Q. (BY MR. PATTON) Okay. Have you ever -- has anyone at those meetings ever suggested that you do that?

A. Not that I'm aware of.

Q. Would you agree with me that in an area like Houston where there's such a large concentration of refineries, if you and your colleagues here in the Texas Gulf Coast area did that sort of investigation, you might have an improved understanding of benzene as a causative factor in myeloid leukemias?

MR. PERRY: Object to form.

A. Well, I would have to say that that's been done to a certain extent. In fact, I can remember in the -- probably the early '80s, there was a lady from M.D. Anderson who came and collected all my cases of acute myeloid leukemia, including their slides, and she was looking to see where they lived in the Gulf Coast, what type of leukemia they had, and I don't know if that data ever got published or not. But that kind of work has been done.

Q. (BY MR. PATTON) But did you note -- do you routinely note on your patients' charts whether or not they've been exposed to benzene?

A. If they say that, yes.

Q. Do you ask it specifically?

A. Yes. I ask them if they've had any solvent exposure, do they have any unusual habits? Do they paint? Do they do welding work? Do they have any -- any exposure to unusual pesticides that they spray on a regular basis, yes, we ask those questions.

Q. Do you teach other students?

A. Yes, we teach students.

Q. Okay. So, that's to say, when you do your rounds in the hallway, you might have a group of medical students with you sometimes?

A. Yes. Typically on a -- in fact, I just rounded about three months or so ago. We have various levels of residents, internal medicine residents, first, second and third-year residents and a few medical students, in this case, from Weill Cornell Medical School in -- in New York. Yes. We discuss cases.

Q. Do you ask them questions? Do you do, like, a Socratic method, a lot of questions and answers to try to quiz them while you're doing that?

A. Yes. Some doctors are meaner than others. I would say I'm less mean. In other words, I don't say give me the five causes of this --

Q. Sure.

A. -- kind of thing. And, so, yes, we do ask them

questions.

Q. Does any of that conversation with your residents ever involve the cause of their myeloid leukemia -- a patient's myeloid leukemia?

A. I'm sure it would. On this particular rotation, we didn't have any acute myeloid leukemias; but that -- I'm sure -- that would come up, in other words. Whatever the illness is, causation, whether it's hepatitis or congestive heart failure or acute leukemia, any of those illnesses, we would discuss causation, as well as therapy.

Q. So, you might have a patient with myeloid leukemia and -- and in the question-and-answer session with the resident, might a conversation start about his exposure to work as a refinery worker or chemical exposure?

A. Well, it would -- it would come out in the discussion. In other words, if I saw somebody with acute leukemia, I would ask the intern, what's this person's background, what's his occupation, the same kind of questions I ask the patient if I saw them without an intern or a medical student.

Q. Have you ever told a patient that your form of myeloid leukemia was more probable than not caused by benzene exposure?

A. Yes.
Q. Have you ever told a patient that it was more probable or not caused by, say, radiation or chemo drugs?
A. Yes.
Q. How is it that you drew the conclusion that your given patient, the one that you pointed out, his disease was caused by benzene exposure? How did you reach that conclusion?
A. Well, this was a man who had erythro leukemia, which is a form of leukemia that's known to be potentially caused by benzene or other chemicals.
Q. I don't see it on the chart. Where is that one?
A. That's M6. I'm sorry.
Q. Okay.
A. And he worked at, I believe, a Cities Service plant in Louisiana and repeatedly he had been in the workplace, found to have a very low white blood cell count, taken away from the workplace and his blood counts recovered. He'd be put back in, and they'd go down again. So, it looked like whatever he was working with was whacking his blood count. And I asked him what he worked with. And he told me that he worked with cycohexene or benzene. He worked with phosphorus

compounds. He worked with nickel compounds. I've forgotten all he -- he told me with, but he worked with a lot of potential toxins, benzene being one of them. And, so, I said to him, I think it's highly likely because we know you've had enough exposure to acutely damage your marrow, I think that one or more of those chemicals is a consequence of your leukemia.

Q. And importantly, you could look at his blood tests that were being conducted at his workplace and you could see that trend of white cell movement, so to speak?

A. Well, I could ask him. In other words, he volunteered that information. I -- I did have some records of that, too, but -- but some of this was his recollection of what had happened to him.

Q. Can benzene cause white cells to go up?

A. I would hate to say never, but traditionally we think of chemicals as causing leucopenia, or low white counts.

Q. Benzene can cause white cells to go down?

A. Yes.

Q. Can benzene cause red cells to go up?

A. Not that I'm aware of.

Q. Can benzene cause red cells to go down?

A. Yes.

Q. What about platelets?
A. Yes, benzene can cause platelets to go down.
MR. PERRY: Let's take a restroom five-minute break whenever you get to a point.
MR. PATTON: Okay. I'm almost to that point.
Q. (BY MR. PATTON) Can benzene cause red cells to go up? I'm sorry.
A. I think you --
Q. Platelets.
A. No.
MR. PATTON: All right, Doctor. Let's take a break. Off the record.
THE VIDEOGRAPHER: Now going off the video record. The approximate time is 11:23.
(Recess taken from 11:23 to 11:35.)
THE VIDEOGRAPHER: Now back on the video record. Approximate time is 11:35.
Q. (BY MR. PATTON) Dr. Natelson, can you estimate for us approximately how many patients you've treated with myeloid leukemias?
A. That would be -- be difficult. In other words, for example, right -- currently, following about, I'd say five or six people with chronic myeloid leukemia on various forms of therapy. Over the years I've seen many

more than that. I've transplanted two people myself with CML.

With acute leukemia --

Q. I'm talking about all of them, the whole family of diseases.

A. The whole family of diseases?

Q. On Exhibit 8 there.

A. Oh, I -- I would have to say that if you're including myelodysplasia, myeloproliferative diseases, CML, AML --

Q. The whole -- the whole Exhibit 8.

A. -- the whole -- it's certainly well in excess of 200. It could be much more than that because in -- I've been involved in teaching for many, many years. And, so, I follow some of my own patients and see everybody else's, too. And, so, it's been a very large number. These are not common illnesses, but for hematologists, they're frequently seen.

Q. Well, especially over 35 years, right?

A. Yes, I've seen many, many such patients.

Q. Okay. A thousand or more, would you estimate?

A. I really couldn't put a number on it. Let's put it this way. I've done at least 7,000 bone marrows in my career and all of those were on somebody and -- and a lot of them didn't have acute myeloid leukemia or

one of these neoplasms but a number of them did. And, so, it's just many. I couldn't put a number on it.

Q. You said bone marrows. Is that when you do a bone marrow aspiration, a biopsy? You get that --

A. Yes.

Q. -- that big needle and you put it in somebody's --

A. Oh, it's not that big. As I tell my patients, it doesn't hurt at all. Of course, I'm talking about me. But, no, actually bone marrows, if they're done properly, are not very painful. And -- and as I say, I've done 7,000 in my career.

Q. Raul hates them.

A. Does he?

Q. And maybe he just needs to have someone else doing them.

A. I don't know. I mean, I must say that it takes me about five minutes to do one; and it's been a rarity that a patient has any sort of complaint afterwards.

Q. Okay. So, of the hundreds, can we say hundreds of patients --

A. Yes.

Q. -- who you've seen with myeloid leukemias?

A. Yes.

Q. Of the hundreds you've seen, how many have you

concluded and told that patient, hey, benzene is a factor in your disease or probably a factor?

A. I recall that particular patient.

Q. Recall one?

A. It's an unusual patient. I've certainly seen others that I've told that to, but I -- as we sit here, I can't remember; but I'm -- I'm certain that I have. But that one stands in my mind because we did a number of unusual studies on his case and I have photographs of his bone marrow and a lot of information about him.

Q. Is there a certain amount of benzene exposure that you would like to see before you give an opinion that benzene is a -- a causative -- plays a causative role in someone's myeloid leukemia?

A. Well, we usually look for cumulative exposure, whether it's chemotherapy or benzene, because that seems to be more closely related to disease.

Q. Is there a cumulative threshold, a line, so to speak, above which you conclude, hey, benzene is a causative factor?

A. Well, in many cases -- in the case of chemotherapy, we --

Q. I'm asking about benzene.

A. I understand. But I -- I have to preface that. In the chemotherapy, we have very accurate estimates,

because we know Mr. Brown sat down at high noon and he got so much injected into his vein. There's no argument about what he got.

In the case of benzene, we have estimates, which are often guesstimates. And, so, when someone says they have 40 part per million exposure, it might be 20 or it might be 80. And, so, we just know it's high. And, so, my -- my philosophy about that is it needs to be a lot of exposure. If one wanted to put a number on it, it would need to be a cumulative dose of greater than 40 part-per-million years because we know that the studies below that don't suggest an increase in AML.

Q. It is your opinion that a patient must have above 40 part-per-million years before you can conclude that benzene was a causative factor. Is that your testimony?

A. Yes, that would be my testimony.

Q. Okay. And then you mentioned chemo drugs. What -- instead of a part per million year, or a PMM, how do you measure those chemo drugs?

A. In milligrams.

Q. Okay. Does the patient have to tell you, hey, Doc, I had X amount of milligrams of these chemo drugs before you can draw that conclusion?

A. Well, you can calculate that. In other words,

chemotherapy is often very standardized, whether it's breast cancer or Hodgkin's disease; and when you give a person a course of chemotherapy, there's a pretty fixed number of milligrams per kilogram body weight. And, so, you can have a pretty close idea. If someone said I had six courses of chemotherapy, I can tell you to the milligram pretty much what they had.

Q. And you can go to the chart and you can add up exactly how many milligrams they had?

A. That's correct.

Q. Okay. And then you can draw the conclusion pretty quickly because, as you said, he's sitting there at high noon, taking the chemo drugs?

A. Yeah.

Q. You can say, hey, this chemo definitely caused it because you don't have to estimate anything, right?

A. Well, I still can't say the chemotherapy definitely caused it. I can just say that he's had enough milligrams of whatever the particular drug is because it varies a lot in terms of the number of milligrams necessary to predispose to AML. But I can say that this person has had enough exposure to put them into the arena where it's highly likely that the -- that that chemotherapy was the -- that the AML was a consequence of that chemotherapy.

Q. Well, how about these patients who've come to you with what you have told them, hey, benzene is a causative role in your leukemia? Have they been able to give you the dose of PPMs of benzene that they received?

A. No. But they've been able to tell me what they did, how they worked with benzene, what were they working with.

Q. Okay. And did they tell you -- how -- how would they describe it?

A. Well, they might say, I used pure benzene to wash off parts of my tools. Or they might say, I was engaged in manufacturing products where benzene was a raw product that went into the manufacturing.

Q. Products like gasoline, right?

MR. PERRY: Object to form.

A. It depends on what they did. If they were just transporting it, the gasoline was already concocted. In other words, what -- what they -- what they did in the process, what were they engaged in making.

Q. (BY MR. PATTON) But do they give you a dose? Do they give you a dose comparable to when you look at someone's chart with chemo drugs?

A. No, they would not.

Q. Okay. And then do you require them to go back and hire an industrial hygienist and take wind

measurements and other calculations before -- and then come back with a piece of paper, hey, Doc, I got X amount of PPM-years. Do you require that of your patients before you give them that opinion?

A. No.

MR. PERRY: Object to form.

Q. (BY MR. PATTON) You can draw conclusions based on your understanding of the -- sort of the nature and duration of someone's exposure to benzene or benzene-containing chemicals. You can draw upon that information and reach conclusions that, hey, benzene might be a causative factor?

MR. PERRY: Object to form.

A. Well, not so much their -- as I said, in the case that I thought clearly that chemicals caused it, I had evidence of blood count damage; and I might have that, because in many industries patients get routine physical examinations.

Q. (BY MR. PATTON) Would you agree with me that routine physical examinations and routine blood counts are helpful for physicians like yourself to determine whether benzene was a possible role in someone's leukemia?

A. Yes, I would say that's true.

Q. Would you agree with me that regular blood

counts are helpful in protecting workers who have had a little bit of bone marrow damage such that you can protect those workers by getting them away from the benzene? Is that fair?

A. One can argue with that. That's reasonable.

Q. For instance, if this guy who you mentioned from Louisiana came in and you started seeing his counts in his blood tests, you could scratch your head and say, hey, don't go back to that job, right?

A. Yes.

Q. Okay. You would agree with me that regular blood counts are helpful in protecting workers from the harmful effects of benzene exposure?

MR. PERRY: Object to form.

A. That would be -- yes, that would be one form of protection, yes.

Q. (BY MR. PATTON) Okay. What about urine? Can you detect benzene in the urine?

A. Well, you can detect metabolites; but they don't last very long. And, so, I wouldn't say that that's a very accurate way of knowing whether somebody had a cumulative exposure that was of consequence.

Q. Okay. You believe that the cumulative exposure to be of consequence must be above 40; is that right?

A. Yes, meaning that when -- when someone tells me

the cumulative exposure was 40, it could really be 80; or it could even be higher than that. In other words, I'm looking for a very high, cumulative exposure.

Q. Well, in this case we have evidence that Raul's cumulative exposure was around 25.

MR. PERRY: Object to form.

Q. (BY MR. PATTON) It could have been 50, correct?

MR. PERRY: It could have been zero. Object to form.

A. I don't know. I can't -- I can't comment about what his exposure was. I'm not an industrial hygienist or a -- or a person who models those types of exposures.

Q. (BY MR. PATTON) For each of your patients who you concluded benzene played a causative role, did you have part-per-million-year cumulative dose information at your fingertips?

A. No.

Q. You did a qualitative assessment where you assessed the quality of the information, what was known about their exposure; and you used that type of assessment to draw your conclusion?

A. In part, yes, qualitative and whatever blood count material they provide me.

Q. Not just for the one guy but for the others who you've given that opinion, right?

A. Yes. And actually, you know, when we talked about that, it's come to my mind that I have seen other people who have had the same phenomenon of working in an industry and having reduced blood counts; and I have advised them to stay out of that arena.

Q. Because you recognize that benzene can cause myeloid leukemias?

MR. PERRY: Object to form. Not specific.

A. Well, I recognize that, yes, that is certainly true, benzene can cause certain types of leukemia, AML and certain forms of myelodysplasia.

Q. (BY MR. PATTON) Is there a safe level of exposure to benzene?

A. Well, obviously, the -- we have benzene in bananas and no people -- nobody would think eating a banana gives a person acute leukemia. So, all we can say is safe from what? And if you're talking safe from acute myeloid leukemia, I think the literature suggests that levels below 40 part per million year cumulative dose would not be suggestive of causation of AML.

Q. Do people experience damage to their bone marrow before it reaches full-blown AML?

A. Well, certainly people can have myelodysplasia and then that can eventuate in AML.

Q. Have you ever had a patient come in and you've

recognized that benzene was a possible causative factor in their disease, did you ever tell them to go home and don't eat bananas?

A. I didn't tell them to go home and not eat bananas.

Q. Well, you said -- benzene is in bananas.

A. It is. There is benzene in many foods, bananas being one of them that happens to be high in benzene; but we're talking trivial doses, very tiny doses. That's why I say, you know, the dose to me to cause AML needs to be extraordinarily high.

Q. Well, you're talking about a cumulative period, where you want to see 40 --

A. That's correct.

Q. -- forty PPM.

A. Yeah.

Q. What about, like, on a daily period? What do you consider to be a safe level of exposure to benzene --

A. Well --

Q. -- when someone is at work with chemicals?

MR. PERRY: Object to form.

A. Well, there are limits that have been set by government agencies of, you know, 1 part per million daily exposure. And that's reasonable, but I -- as I

say, that's not my field to determine the measurements of those in a particular person's occupation.

Q. (BY MR. PATTON) Well, but -- but it is sort of within your field because you're saying you need to see a 40-part-per-million-year cumulative dose. And I'm asking you on a more short-term basis, okay, on a daily basis. I'm not asking you what government thinks. I'm not asking you what a PEL or a TLB is. I'm asking what you think, as Dr. Natelson, as an expert for Shell, is a safe level of daily exposure to benzene?

MR. PERRY: Just one second. He's answered the question. He told you it's not his area. You may not like the answer, but he answered the question. He can answer it again, but you've already asked it and he's already answered it.

Q. (BY MR. PATTON) Let me try to ask it again in a different way.

Doctor, do you have any opinion on what a safe exposure level to benzene is on a daily basis for someone working with chemicals?

MR. PERRY: Same objection.

A. No.

Q. (BY MR. PATTON) You don't have an opinion on that?

A. No. I have an opinion on the cumulative dose

that related to AML, but individual daily doses, I know what the requirements are, but if a person is over that requirement for 24 hours, I -- I can't comment about that. I don't know that that would be of -- of importance.

Q. If someone is being exposed to benzene in their daily work, would it appear in the daily -- or would it appear in regular blood tests?

MR. PERRY: Object to form.

A. Probably not unless it was a very high number.

Q. (BY MR. PATTON) Well, what number would it have to be on a daily basis for it to appear in regular blood tests?

A. I would have to look that up. I think that information is known. I believe that when you get something like an acute 20- to 40-part-per-million exposure, you can get a reduction -- significant reduction in the white count, but I'm sure that information is out there, but I don't have it at my fingertips.

Q. Have you -- I'm going -- I'm going to give you a number -- new topic here, okay? The number is 50, okay? Would you estimate that you have told more than 50 or less than 50 patients that benzene was a factor in their leukemia? Any type of leukemia.

A. Less than 50.

Q. Less than 50. Would you estimate -- how many -- well, first of all, you've testified as an expert in cases involving benzene exposure, right?

A. Yes.

Q. You have always testified on the side of industry, including Shell, correct?

A. Yes.

Q. Same number, 50, can you estimate if you have given the opinion more than 50 times or less than 50 times that benzene was not a cause of someone's leukemia?

A. Well, it would be less than 50 because many of these cases don't have anything to do with -- with acute leukemia, chronic or acute. They have to do with illnesses, like myeloma or lymphoma, other illnesses of which benzene is not causative.

Q. Well, let me -- let me approach this in a different way, then. We're setting the number at 50. How many patients with any form of disease, okay, myeloid, non-Hodgkin's lymphoma, what have you, above 50 or below 50, how many patients of yours have you told they had a benzene-related disease?

A. Below 50.

Q. Below 50.

Have you testified more than 50 times that someone's disease was not caused by benzene?

A. I'd have to count that up. I don't know. It's -- it's possible. We have that list of cases. Now, many of them are malpractice cases and other things. They may not all be benzene cases.

Q. Okay. We'll go through your chart in a little while.

Is it your opinion in this case, Doctor, that Raul Zendejas' leukemia is not related to benzene exposure?

A. It is my opinion that his original illness, which is atypical CML or Philadelphia chromosome negative CML, I do not believe that illness can be caused by benzene exposure.

Q. Did he have CMML as well?

A. CMML? No. That's a separate illness.

Q. Did he have AML?

A. He had -- he -- he developed a -- blasts in his blood. And, so, he had blasts as a consequence of his underlying atypical CML. That's often referred to as a blast crisis.

Q. Did he have AML?

A. I wouldn't call it AML.

Q. Would you recognize that some other

practitioners might call it AML?

MR. PERRY: Object to form.

A. Yes.

Q. (BY MR. PATTON) Is it your opinion that benzene was not a causative factor in Raul's blast crisis or AML?

A. Correct. It was not a causative factor because that's the natural history of this illness.

Q. Now, what do you mean "the natural history"?

A. The natural history of people with CML or atypical CML is, depending on the treatment, is to develop a blast crisis over a variable period of time.

Q. They can develop AML?

A. If you like. They can develop lymphoid blast, too. They can develop an acute illness characterized by an outpouring of immature cells from the bone marrow that we commonly refer to as a blast crisis, either myeloid or lymphoid; and as I've said repeatedly, some might call that an AML syndrome, some might not because its behavior is different than an AML syndrome.

Q. Someone can come in as a patient and be diagnosed with any one of those forms of myeloid disease on your chart in front of you, correct?

A. Yes.

Q. Okay. And someone could possibly then move to

AML or move to blast crisis, correct?

A. Yes. They could move to AML from forms of myelodysplasia, forms of atypical CML or other myeloproliferative diseases.

Q. Is it your opinion that unless they come into that chart with AML, there's just no way benzene was a factor?

MR. PERRY: Object to form.

A. Well, I think I've said, if they come in with myelodysplasia, that can be a benzene-related illness, certain forms of myelodysplasia; and they can eventuate in AML.

Q. (BY MR. PATTON) What about myeloproliferative disease, MPD, can that become AML?

A. M -- yes, it can become AML. And myeloproliferative diseases have not been related to benzene exposure.

Q. Is it your opinion that benzene played zero role in Raul's myeloid leukemia?

A. It is my opinion that benzene exposure played a zero role.

Q. I mean, if we're on a scale here, you're pretty far on the end. You're saying zero. It didn't have 1 percent factor. It had nothing to do with his leukemia?

A. I don't believe it had anything to do with his leukemia.

Q. Do you agree with me that Raul was exposed to leukemia?

A. You misspoke.

MR. PERRY: Object to form.

Q. (BY MR. PATTON) I'm sorry. Was exposed to benzene.

MR. PERRY: Object to form.

A. He was exposed to gasoline, which has benzene as a component.

Q. (BY MR. PATTON) Is it your opinion in this case that Raul's exposure levels to benzene, whatever they were, were not enough to cause his myeloid leukemia?

MR. PERRY: Object to form.

A. That would be true. I don't know what his levels would be, but I do not believe that they caused him to have his blast crisis.

Q. (BY MR. PATTON) Do you believe -- do you have any opinions as to what may have caused Raul's disease?

A. The cause of atypical -- the cause of atypical CML and its natural progression toward an AML-like syndrome is unknown.

Q. Do all diseases -- do all myeloid diseases which end up AML, don't they go through some other phase

of one of the other diseases on your chart there?

MR. PERRY: Object to form.

A. No. In many cases acute myeloid leukemia, one week you don't have it, the next week you do.

Q. (BY MR. PATTON) But aren't there cell changes going on that if you catch a snapshot of those cells before they've gotten to the point of AML diagnostic criteria, you would catch them at different levels, correct?

A. Well, as I said -- and we know a lot of this from people who have relapsed. They've had AML and then they go in remission and then relapse. It's remarkable how rapidly AML can take over a normal bone marrow. And that's why I say, a person can have a perfectly normal bone marrow and blood count one week, and two or three weeks later they can have florid AML with 80 percent blasts in their bone marrow.

Q. What are the -- what are the blood counts that a normally healthy individual should have?

A. Well, the normal total leucocyte count, or white count, is said to be around 5 or 10,000.

Q. Okay. White count, 5 to 10,000?

A. And that's somewhat racial because black individuals have white counts on average 1500 cells less than -- than white people. So, I commonly would see a

black person with a 3500 white count. That would be normal for them.

Q. What about red?

A. The red count -- the -- normal for a man would be hemoglobin of, let's say, 14 or so; and that in part depends on where you live. If you lived in Denver where the oxygen level is low, the normal hemoglobin might be 16. In Houston, it's about 14.

Q. What about platelets?

A. The normal platelet count is generally given as 150 to about 250,000.

Q. Okay. Now, if someone has AML, what white counts -- what -- what range of white count would you see or expect to see?

A. Well, it depends on the phase of the illness. For example, what happens in AML is you suddenly catch the disease and the bone marrow starts to fill up with blast cells; but blast cells have difficulty in escaping the bone marrow. So, the first manifestation is a low white blood cell count.

Q. What numbers?

A. You might get a white cell count of 1900.

Q. Okay. Now, let me ask you this: Do the white cells just go from, say, 5,000 to 1900? That's to say the, was it, 3100 white cells just automatically

disappear; or do they move down to a lower level where they end up at 1900?

A. Well, they -- they move down, depending how fast the leukemic process is ongoing in the bone marrow. As I said, you're -- in the case of the white blood cells, you're replacing them normally three times a day. So, if you suddenly fill up your bone marrow with blast cells, your white count falls pretty dramatically very fast. And then once the bone marrow fills up with those blast cells and they do come spilling out, then suddenly the white cell count rises and can go well over a hundred thousand.

Q. There is a transformation, there are manifestations going on in the cells before the disease reaches full-blown AML, correct?

A. Well, that's obviously so. In other words, something happened to favor reproduction of a clone of cells that are leukemic. And in many cases we don't have a clue as to what that -- what happened.

Q. Benzene can be the thing that makes that happen, though, correct?

MR. PERRY: Object to form.

A. Well, benzene is a -- is a known potential cause of AML. So, benzene exposure at certain levels can cause damage to cells that may eventuate in AML.

Q. (BY MR. PATTON) I thought you said benzene can cause MDS as well, right?

A. Yes, it can.

Q. Okay.

A. It can cause MDS, too.

Q. And is it your opinion, Doctor, that someone cannot catch a bone marrow disease in between normal and AML, such that we can't tell whether or not someone is progressing towards AML?

MR. PERRY: Object to form.

A. Oh, I think I understand your question a little better when you said it that way.

Q. (BY MR. PATTON) And let me -- let me try to ask it a little bit differently, okay? If you take a snapshot of a normally healthy individual today and you say, okay, this person is healthy. And then you go six months from now; you take a snapshot of them; you say, boom, they have AML, okay? In between that process, they are progressing through these other myeloid diseases, correct?

MR. PERRY: Object to form.

A. No. In certain circumstances, yes. I'll try -- I can clarify that. In the case of what we call de novo AML, very characteristically we see no changes in the blood count until, bingo, we have AML. If we

have an illness that's chemical related --

Q. (BY MR. PATTON) Like benzene related?

A. Like benzene related or chemotherapy related, about two-thirds of the time we go through a phase of myelodysplasia, where the --

Q. Did Raul go through a phase of myelodysplasia?

A. No. He's never had myelodysplasia.

Q. Okay.

A. We see a period of myelodysplasia, which is usually characterized by an advancing anemia, would be the most common phenomenon, sometimes associated with a low white count and low platelet count; and we may see that get worse and worse over time until leukemia eventuates.

Q. Did Raul have a myeloproliferative disorder --

A. Yes.

Q. -- MPD? He did have MPD?

A. Yes.

Q. Does MPD naturally progress to AML?

A. It can.

Q. It can progress to AML.

Does benzene cause MPD?

A. No.

Q. Benzene causes AML, though, yes?

A. It may.

Q. Okay. What do you believe to be the disease that Raul had? Where does he fit in on the chart?

A. He has a myeloproliferative disease, or these days it's been changed to myeloproliferative neoplasm, MPN. So, you can call it MPD or MPN. And his particular form of MPD or MPN is Philadelphia chromosome negative CML or atypical CML.

Q. And then he also had blast crisis AML?

A. He also developed a blast crisis as part of the natural history of that illness.

Q. Is MPD on your chart? MPD is a myeloid leukemia or a myeloid disease, right?

A. Myeloproliferative disease would be -- would be -- or myeloproliferative neoplasm -- would be a myeloid disease, yes.

Q. Is blast crisis on your chart? Would that be a myeloid disease?

A. It could be, if it's a myeloid blast crisis; or it could be a lymphoid blast crisis.

Q. What did Raul have?

A. He had a myeloid, I believe.

Q. Is that a myeloid disease?

A. Yes, it involves myeloblasts.

Q. Can we write -- is it fair to write "blast crisis" over by the AMLs, or where would you put them?

A. Well, I wouldn't put it -- call it as an AML because the biologic characteristics of a blast crisis are very different than AML. I would call it blast crisis.

Q. Okay. Let's put it on there.

A. Let's put it over here.

Q. Your natural tendency seem to be to put it over there by AML, as compared to the --

A. Well, because it's characterized by a lot of blasts, as AML is.

Q. Fair enough.

A. So, it has similarities with AML.

Q. AML is a potential -- is potentially a deadly cancer, correct?

A. Yes.

Q. Atypical CML, potentially a deadly cancer, right?

A. Yes.

Q. What are the treatment options for someone with myeloid leukemia? Bone marrow transplant, that's one of them?

A. Well, with acute myeloid leukemia, we -- we know off the bat a little bit about the situation based on the chromosome analysis. In other words, we know that if they have either no chromosome abnormalities,

which about 40 to 50 percent of cases don't have that, or if they have particular chromosome abnormalities that are very unusual -- have unusual susceptibility to chemotherapy, we might cure them with chemotherapy alone. So, our first line might be chemotherapy in an AML.

Q. Was Raul Zendejas treated with chemotherapy?

A. Of a form. He was treated with Hydroxyurea, which is an oral medicine that we don't much use for acute myeloid leukemia.

Q. Do you have an opinion on whether or not that Hydroxyurea caused his AML or his blast crisis?

A. No. There is some evidence, limited evidence that long-term use of Hydroxyurea predispose to AML in a patient with myeloproliferative disease; but he just had short-term use of that drug. I don't think it had anything to do with his blast crisis.

Q. Raul received a bone marrow transplant, correct?

A. Yes.

Q. Is that common or typical for folks who have his disease progress?

A. Well, that's an interesting question. It's common in people with AMLs. I would think that's probably the most -- the usual circumstance where

someones tries to transplant a person.

In CML-like illnesses, transplantation used to be the standard curative care; but with the advent of the modern drugs, that's done much less frequently.

Atypical CML, however, if a person is -- is young enough, a marrow transplant would be the best form of therapy.

Q. Same thing for AML, marrow transplant would be the best form?

A. Yes, in many cases AML is the best form to -- to try to get a cure. And even with a marrow transplant, cures are not as frequent as you might think; but -- but they are useful.

Q. In Raul's case, he underwent a bone marrow transplant and then went into remission and underwent a second bone marrow transplant; is that right?

A. Yes.

Q. Do you have any opinions, Doctor, as to what his chance of survival was before the first bone marrow transplant, after the first one, and then after the second? Do you have any opinion on those?

A. Well, only in general terms. In other words, we would think atypical CML is -- without a marrow transplant, you would have to say that it's an

ultimately fatal illness. It's not always ultimately fatal by conversion to blast crisis, but it's ultimately fatal. You may die of bleeding from a low platelet count or other reasons. So, he had a fatal illness without the transplant.

Q. And he was treated like AML, correct?

A. In terms of a transplant, a transplant is a transplant. The preparative regimens would be similar regardless of what you're transplanting him for.

So, he was -- he was given a transplant, and I believe his preparative regimen was about the same as the type I used in the 1980s. It was a standard preparative regimen for a transplant. And -- and what you expect to see is a person to get a take of the transplant, hopefully not to get too much graft-vs.-host disease and go into remission.

Q. Did you see where Raul had graft-vs.-host disease?

A. Yes, he did have some graft-vs.-host disease. And that's actually considered a good thing because the graft-vs.-host disease suppresses the leukemic cells or the malignant cells; but you just don't want too much of a good thing. And then he had a second transplant. And in general, if you were taking people and transplanting them for, let's say, CML, typical or atypical, you might

get people into remission perhaps 70, 80 percent of the time; but over time those patients will relapse, even in typical CML. And, so, if you look at the people over many years who have had transplants with -- with CML, let's say, and you look, let's say, ten years out, I believe the latest figures I've seen are about 60 percent of them are still alive.

Q. Have you ever given a patient two bone marrow transplants?

A. I personally have not, but some of my patients have had -- that I've referred elsewhere for transplants.

Q. Is it uncommon to give two bone marrow transplants?

A. I would say -- I can't tell you the frequency. I'm not a transplanter full time. But I would say it's obviously less common to give two than to give one. And -- and patients have had three transplants. But what happens is you run out of gas somewhere along the line. You can't get away with doing this kind of treatment over and over to people.

Q. Raul comes in; and he's diagnosed with atypical CML, correct?

A. Yes.

Q. If not for the first transplant, would he have

probably died?

A. Yes.

Q. And what would he have died of?

A. Well, what most people with acute leukemia die from, because they have very low platelet counts, they're susceptible to bleeding and to infection. So, it wouldn't be the leukemic cells, per se, infiltrating an organ and causing liver failure or something like that or heart failure. It would be because lack of normal white cells predisposed to a major infection and the person died or lack of platelets predisposed to bleeding and they bled in their head and died.

Q. My point is this, Doctor -- we're going to go through some of these studies in a little while, okay?

A. Yes.

Q. If Raul had not received the first bone marrow transplant, would he have died of AML?

A. Well, what the articles say is there's about a 30 percent incidence of AML-like-disease blast crisis in people with atypical CML. So, you would say he would have a 30 percent chance of dying with AML at a -- and a 70 percent chance of dying from the disease with some other manifestation of it.

Q. It could become a form of MDS?

A. I don't think it would become a form of MDS;

but he would have died from cytopenia, most likely.

Q. If Raul were to die after the bone marrow transplant, the first one, would he have died of AML?

A. He could have died of graft-vs.-host disease.

Q. What about after the second bone marrow transplant, would he have died of AML?

MR. PERRY: Object to form.

Q. (BY MR. PATTON) Could he have died of AML?

A. Yeah, he certainly could have, yes.

Q. Okay. So, in some of these studies, Raul might be called an AML, right?

MR. PERRY: Object to form.

A. Some people might call him an AML, yes.

Q. (BY MR. PATTON) Okay. As far as your -- your opinion that it takes a 40-part-per-million-year cumulative dose to cause benzene -- or to cause a benzene-induced leukemia -- that is your opinion, correct?

A. Yes.

Q. Okay. Who would agree with you and who would disagree with you on that opinion?

MR. PERRY: Object to form.

A. I don't know. I've referenced some articles, for example, one study by -- well, I've referenced, I think in this case, a study by Bloemen; and they had

people working with benzene-specific reactions and their people had a mean exposure of 39 point, let's say, 9 part per million years and they didn't have a statistically significant increase in AML. So, in that particular study, I guess they would agree with me, that you would have to have higher than that.

Q. (BY MR. PATTON) Are there people out there who disagree with you as to that threshold?

A. I'm sure there are.

Q. And are there people out there who believe there is no safe level of exposure to benzene?

A. I think there likely are, although I think that's kind of an irrational statement.

Q. Individual susceptibility may vary when we talk about someone's chances of getting a myeloid leukemia from benzene exposure. True statement?

A. That would be speculation.

Q. Would you agree with me that some people are just more susceptible to feel or receive the harmful effects of benzene than others are?

MR. PERRY: Object to form.

A. There's no evidence for that. Some -- I think one article by Richardson suggests that there's a difference in susceptibility based on age. I think that's very soft data. I think that if you look at our

chemotherapy data, you don't see that. In other words, if you look at the number of milligrams of Cytoxan it takes to catch AML after breast cancer, it's related to the number of milligrams, not the -- not the age of the patient or anything else about the patient.

Q. (BY MR. PATTON) So, if we see in certain studies, certain government literature, even certain documents from Shell, where it says "No safe level of exposure to benzene," individual -- "individual susceptibility may vary," you disagree with those statements, correct?

A. Well, I say, if you take the position that there's no safe level, that would mean we can't eat bananas anymore. So, that's why I say it's an irrational comment.

In terms of the fact that there is different individual susceptibility, that may be so. I don't disagree that that's so. I would just say there's no evidence for that, proven evidence.

Q. Would you agree with me that there are studies out there that deal with the myeloid leukemias in general and they do find a statistically significant connection between myeloid leukemias and benzene exposure at cumulative doses below 40 part per million years?

MR. PERRY: Object to form.

Q. (BY MR. PATTON) Do you agree with that?

MR. PERRY: Object to form.

A. There may be such studies out there. Some would have -- not be statistically significant. And there are some studies out there that find no acute leukemia with higher than 40-part-per-million-year exposures.

Q. (BY MR. PATTON) There are studies out there that support the position that -- that less than 40 part per million years can cause leukemia, right?

MR. PERRY: Object to form.

A. That's probably true.

Q. (BY MR. PATTON) Okay. When you reached your conclusion, your opinion, that it takes 40-part-per-million-year cumulative dose, how did you -- how did you rationalize, dealing with those studies out there that show a number less than that, when you formed your opinion?

A. Well, because my opinion is based on the overall findings in the literature; and I think that there are enough studies out there suggestive that you only see statistical significance with higher than -- than 40 part per million years and I think that that is the position taken. I think one of the papers I

reference is -- is a government agency position. They use that same number. I think that you have to look at all of the evidence and the numbers of patients in the studies, how well the studies were done --

Q. What if --

A. -- and so on.

MR. PERRY: Wait, wait. Let him finish.

Q. (BY MR. PATTON) I'm sorry. I didn't mean to cut you off, Doctor.

A. No, go ahead.

Q. What if a study is not statistically significant? Is it meaningless? Should we just throw it away? Or how do we deal with that in -- or how do you deal with that in forming your opinions for something like this case?

A. Well, what you're looking for in epidemiologic studies, because there is always all sorts of bias in epidemiologic studies, you're looking for a -- repetitive findings. In other words, in the case of cigarette smoking and AML, there are repetitive findings. Some of them don't show a great excess of AML with cigarette smoking; but when you look at the bulk of the studies, there's general agreement that, whereas, you don't see the incidence of -- like you do with lung cancer from smoking, but you do see ultimately a

statistically significant increase in AML from cigarette smoking.

Q. Those studies -- that's a good topic that you bring up, smoking. Those studies that deal with myeloid leukemias and smoking, do they talk about how much someone needs to smoke before it's a causative factor?

A. Well, in the Surgeon General's report, he says a 20-pack-year history predisposes to a doubling of the risk.

Q. Twenty pack years, doubling of the risk of --

A. AML.

Q. -- of AML.

Is that your opinion?

A. Well, I -- I would say that what the literature suggests is that if you're a smoker, the studies -- I think Dr. Estey of M.D. Anderson in a Lancet review said the studies have varied from about a 1.7 to about a 2.3 risk increase with -- with smoking and generally that would be someone who has had about a 20-pack-year history.

Q. Does the body of literature that deals with smoking and its connection to AML, does it factor in the brand of cigarette?

A. Not that I've seen.

Q. Does it factor in what year the cigarette is

from? Like the '70s, as compared to the '90s?

A. I would have no idea.

Q. Do they factor in whether they're lights or menthols?

A. I would have no idea.

Q. Do the studies on smoking deal with whether or not they're 100s or regulars?

A. I would have no idea.

Q. Do they deal with whether they're filtered cigarettes or nonfiltered cigarettes?

A. I would have no idea.

Q. Do the smoking studies include cigars?

A. I don't -- no, I think it's primarily cigarette related.

Q. Okay. Do they deal with the manner of smoking, for instance, how many puffs someone takes?

A. No.

Q. Do those studies factor in how long someone holds in the smoke?

A. No.

Q. Have you ever seen people who smoke, but they don't really inhale? They just take it in and blow it out. Have you ever seen that?

A. Yes.

Q. Do the studies take into account that?

A. No.
Q. Do the studies factor in whether or not someone blows the smoke out their nose?
A. Not that I've seen.
Q. Do the studies deal with whether or not someone smokes inside compared to outside?
A. No.
Q. Do they deal if someone is smoking in their car?
A. No.
Q. Do they talk about if the person's coworkers or family smoke?
A. No.
Q. Does it talk about the dermal contact or the factor of the cigarette smoke making its way into the body of -- of someone from just holding the cigarette? Do the studies factor that in?
MR. PERRY: Object to form.
A. I don't know that the smoke would get into the body dermally. Chemicals might. But not that I've seen.
Q. (BY MR. PATTON) So, the studies that deal with smoking, they just conclude, hey, if someone is smoking X amount of packs per year or even if they're just a smoker, they reach that conclusion without going into

the details that I've just mentioned. Is that fair?

MR. PERRY: Object to form.

A. I think that would be fair, yes.

Q. (BY MR. PATTON) Okay. Do all of the studies that support a relationship between benzene exposure and a given form of myeloid leukemia, do they reach the conclusion of a causal relationship without going into details, like temperature, like duration, like benzene concentration, like part-per-million-year dose? Do all the studies that support the connection between benzene and leukemia, do they all go into those little nuances; or do some of them reach the conclusion in a more general sense?

MR. PERRY: Object to form.

A. I think some of them would have -- be in a more general sense because the measurements are not always there and only in some of the studies are there good estimates of what the benzene concentration would be.

Q. (BY MR. PATTON) Doctor, you would agree with me that there are studies that support the conclusion that benzene causes AML and those studies -- some of those studies don't necessarily even evaluate part-per-million-year cumulative dose, correct?

MR. PERRY: Object to form.

A. That's probably true.

Q. (BY MR. PATTON) There are certain forms of studies that just examine a population, "yes" or "no," whether or not they were occupationally exposed to benzene; and then they can draw the conclusion on the strength of association, correct?

A. Well, as I say, I'm not an epidemiologist and I -- I would like to see that the -- generally, it's thought the dose makes the poison and you would like to see if you are trying to attribute a -- a -- an illness to a particular chemical, that they got that chemical and how much they got of it.

Q. But how -- have you ever concluded that someone's smoking was a factor in their AML?

A. As I said, with AML, we can't prove causation. We can only say it was a risk factor.

Q. Okay. So, you can call -- you can call smoking a risk factor in a given patient's AML sometimes, correct?

A. If they've been a heavy smoker, yes.

Q. Okay. And what makes them a heavy smoker?

A. I would say a 20 part -- 20-pack-year history.

Q. You wouldn't consider any of those 15 things I went through, on type of cigarettes, whether they inhale. You'd just call it a pack-year history, right?

A. That's correct.

Q. But for benzene, it's a little different. They can't come in and say, hey, I worked around benzene or I worked around gasoline which contains benzene. You're got to see a part-per-million-year dose to reach your conclusion, correct?

MR. PERRY: Object to form. Misstates his testimony.

A. I have to see a part-per-million dose or evidence, for example, that workers in a particular refinery or a particular setting have higher incidences of AML than -- than a control and it's a properly done study; but in general, I'd like to see a dose level, because we associate cumulative dose of chemicals with AML causation.

Q. (BY MR. PATTON) Did you perform any type of cumulative-dose calculation for Raul's exposure to benzene?

A. No.

Q. Have you seen any cumulative-dose information about Raul's exposure to benzene?

A. No.

Q. Have you seen any reports from any experts about how much benzene Raul was exposed to?

A. No.

Q. Have you seen any information from Shell about

how much benzene workers who are like Raul, who do his type of job or did his type of job, how much benzene they're exposed to?

A. No.

Q. Have you seen any data from Shell about how much exposure to benzene someone experiences when loading -- top loading gasoline without vapor recovery?

A. No.

Q. Have you seen any information from Shell as to the efforts that Shell has undertaken to investigate the relationship between top loading gasoline without vapor recovery and the contraction of myeloid leukemias?

A. No.

Q. Have you seen any data from Shell showing any type of surveys they've conducted on gasoline distribution workers to determine the incidence of myeloid leukemias among that class of workers?

A. No.

Q. Have you ever -- have you seen any data in this case from Shell about how much benzene was in the gasoline that Raul worked with?

A. No.

Q. Have you seen any data in this case showing where Shell recommended that gasoline distribution terminals performed blood tests on their workers?

A. No.
Q. Did you look at any of Raul's tissue or blood samples?
A. No.
Q. Is there any other information you would want to see in this case before -- well, I guess you've already given the conclusion that benzene played zero role in Raul's leukemia; is that right?
A. That is my impression because I think the literature tells us that his diagnosis -- and that diagnosis seems unchallenged in the medical records -- his diagnosis of atypical CML is not a benzene-related illness.
Q. Do you have any opinions on what caused Raul's disease or his disease process?
A. No. I don't --
Q. You have no opinions on what caused it?
A. I don't know what caused it. And that is the position of the medical literature.
Q. Dr. Michael Carroll treated Raul Zendejas. Did you see that?
A. Yes.
Q. He's the one who gave him two bone marrow transplants?
A. Yes.

Q. And I've even seen his efforts described as heroic. Do you agree that it is heroic for someone to go ahead and take the risk of giving Raul two bone marrow transplants?

MR. PERRY: Object to form.

A. I would agree with that. In other words, that's a -- it's a major undertaking to do a bone marrow transplant. And certainly to do it twice, there is added risks, yes.

Q. (BY MR. PATTON) I mean, if you were to meet Dr. Carroll, you might shake his hand and say, hey, good job. You really worked hard to save this patient?

A. Yes.

Q. Okay. Is there anything about Raul's treatment provided by Dr. Carroll that you disagree with?

A. No.

Q. Okay. You can't go through the medical records and say, hey, these doctors should have done something a little different?

A. No.

Q. Okay. I've met Dr. Carroll. I think he's -- he's a little younger than you. I don't think he's been practicing for 35 years.

A. These days, a lot of people are a little younger than I am.

Q. Okay. Is there any type of advice or suggestion that you might give Dr. Carroll about his treatment of -- of Raul?

A. No. I'm sure that the concerns now are late development of graft-vs.-host disease, of course, late relapse of leukemia; and someone like himself who is working daily in a marrow transplant program would have more knowledge than I would about that field.

Q. Raul is -- Raul is still at risk of -- of relapsing and coming down with another version of myeloid leukemia, right?

A. Yes.

Q. How long is he at risk?

A. Well, he's -- I would say he's at risk -- in terms of catching another form of acute leukemia, probably about 12 years after the last transplant, but people continue to die off following transplants over a long period of time.

Q. Speaking of -- of Dr. Carroll, I'll show you what's been marked as Exhibit 5, and that is some of the medical records -- and we might come back to those -- but on the top there is a letter from Dr. Carroll, correct?

A. Yes.

Q. Have you seen that letter before?

A. Yes.

Q. You saw Dr. Carroll's deposition or you read it?

A. Yes.

Q. What does Dr. Carroll believe to be the cause of Raul's disease?

A. He says "I believe there is a reasonable and probable likelihood of a causal relationship between his occupational exposure to refined hydrocarbons and the development of his life-threatening myeloid leukemia."

Q. Do you agree or disagree with Dr. Carroll?

A. I would disagree with him because there's no literature to support this statement.

Q. Did you review the deposition of Dr. Gore taken in this case?

A. Yes.

Q. Dr. Gore is the expert that the plaintiffs hired to give opinions in this case. Is there anything that you disagree with in Dr. Gore's opinions?

MR. PERRY: Object to form.

A. Well, I -- I -- I would have to comment that he alleges that I'm misrepresenting what the M.D. Anderson article says about atypical CML, and I would suggest he needs to reread that paper because what I said is exactly what they said.

Q. (BY MR. PATTON) He called some of your opinions gobbledygook, didn't he?

A. Yes, he did.

Q. And you disagree with that, correct?

A. I think -- I had -- I think my letter was very nicely written and very well supported by the articles that I submitted with it.

Q. But doesn't your letter or your report, doesn't it just keep splitting and splitting and splitting this disease such that any analysis and causation would be meaningless?

A. No. It's just the opposite. I keep focusing on the disease, the disease, the disease. He has one disease, which is atypical chronic myeloid leukemia; and he lived out the natural history of that illness. And that illness is extremely well described in the medical literature, especially in this very large article by -- by the -- Dr. Kantarjian and the other people at M.D. Anderson, and there is no known causation of that literature -- of that illness.

Q. Some of the literature that we have in front of us and some of the literature that Dr. Gore relies on and that Dr. Infante relies on, they talk about myeloid leukemias in general. They talk about ANLL, meaning acute nonlymphocytic leukemia. Is that correct?

A. That's correct. That's a term that's not much used in the United States anymore. The British people like to use that term.

Q. I mean, some of the studies you have with you -- and I know I've said this a couple of times --

A. Yeah.

Q. -- but we're going to go through them. But some of these deal with myeloid leukemias generally. They don't lump it in or they don't split it down to the different distinctions that you've made in this case, correct?

A. It depends what you're referring to. In other words, when I talk about atypical CML, the references that I have there are specific to that illness.

Q. Are they specific to causation of atypical CML?

A. Well, I think they are because at least one of them, for example, deals with all of the illnesses that the WHO puts into this wastebasket category of theirs, this myeloproliferative/myelodysplastic category; and the statement is made that those diseases are of unknown cause.

The World Health Organization has two chapters that I have in here and one of them is a chapter on myelodysplasia and they're not bashful about saying that benzene is a potential cause at high doses

of that illness; but when you read their chapter on atypical CML, there is no etiology proposed.

Q. But some of the other studies, they deal with myeloid leukemias generally, correct?

A. It depends on what I'm referencing. In other words, if -- if I'm making a statement that has to do with acute myeloid leukemia, I would reference that. But the -- the -- we've long gone away from trying to talk about leukemia as a general category of illness. Even within a specific type of leukemia, like acute myeloid leukemia, we're getting into a narrower and narrower focus so that we can better understand those illnesses. There -- there are probably differing etiologies among the differing types of acute myeloid leukemia.

Q. As far as these studies go, have you ever asked Shell to conduct any research on the incidence of atypical CML from exposure to benzene?

A. No.

Q. Have you ever asked your colleagues to perform that type of research?

A. No.

Q. Are you familiar with any specific studies that look into atypical CML and benzene exposure?

A. No -- well, no.

Q. That's to say, the studies by and large, they don't -- they don't stratify or split out atypical CML. They -- they just don't do that, do they, when determining benzene causation?

MR. PERRY: Object to form.

A. Well, but if you look, for example, at Dr. Axsoy's studies, he doesn't split them out. He just says there isn't any CML, not -- not any kind. In other words, he's -- he's got the study, one of the larger studies; and he's a very good investigator, was trained actually in part in the United States. He reviewed all the slides; and he comments in his article, that in the 28 or so thousand, 29,000 people he studied who had a high incidence of AML, he saw a deficit of CML. So, that would be a deficit of anything that looked like CML, whether it was Philadelphia chromosome-positive or negative.

Q. (BY MR. PATTON) Have you seen the studies supporting a relationship between benzene exposure and CML?

A. You'll have to show me what studies those would be.

Q. Okay.

A. The three major studies, the Ply film study, didn't show an incidence of CML. I think your expert

referenced the Chinese studies, and in the -- in one of the articles that he referenced, they found only an increased incidence of AML.

Q. We talked about taking a lunch break, and I think we're going to do that. So, I just want to finish up a couple of quick topics.

You said my experts. Plaintiffs' experts in this case, Dr. Infante and Dr. Gore, you have looked at their depositions, correct?

A. Yes.

Q. And you read their depos, right?

A. Yes.

Q. And are you familiar with the studies they cite in support of their opinions?

A. Yes, in the case of Dr. Gore's, we cite the same studies in some instances.

Q. Okay. And then Dr. Infante, you're familiar with the studies that he cites, correct?

A. Well, I've seen his opinions before, and I have looked at some of his references.

Q. Okay. Are there any -- are there any of the references by Dr. Gore or Dr. Infante studies that you think just have no bearing on the relationship between benzene and myeloid leukemia, such that they should just be thrown in the garbage or shredded and not even

considered?

MR. PERRY: Object to form.

A. Well, I think a reference is a reference; and I think that there may be useful information in some. For example, I've forgotten which one it is, but Dr. Gore references a -- papers on people exposed to gasoline, and I think one of the tables breaks it down to people with less than 15 years -- or more than 15 years' exposure, and neither group had an increased incidence of AML.

Q. (BY MR. PATTON) There's useful information in a lot of these studies, correct?

A. Yes.

Q. My question, again, though, is a little more specific. Are there any of these studies that Dr. Gore or Dr. Infante relied on that you think are just unreliable studies that shouldn't even be considered in the analysis?

MR. PERRY: Object to form.

A. Well, I think that one needs to try to focus on the particular illness in question, which is atypical CML; and I think the bulk of the references from those gentlemen don't focus on that illness.

MR. PATTON: All right. Let's take a break, and we'll talk some more this afternoon.

Off the record.

THE VIDEOGRAPHER: Now going off the video record. The approximate time is 12:33.

(Recess taken from 12:33 to 1:22.)

THE VIDEOGRAPHER: Now back on the video record. Approximate time is 1:22.

Q. (BY MR. PATTON) Dr. Natelson, I'm going to hand you what we've marked as Exhibit 1 to your deposition; and that is your report, correct?

A. Yes.

Q. And starting around -- starting right there near the middle of the page, can you read that first sentence "It is important"? Read that for us aloud.

A. "It is important to note that Mr. Zendejas never received a diagnosis of myelodysplasia (MDS), as currently defined by the WHO or any other modern-day classification system of hematopoietic disorders."

Q. I can stop you right there. Is it your opinion that he did not have any form of MDS?

A. He has no form of MDS.

Q. Okay. Even if we went back in time and classified his disease, like, in the '70s or '80s?

A. No. Atypical CML has never been classified as -- as MDS; and, of course, MDS, 1982, was when it -- people began to use that classification, and not at that

time or prior was -- was atypical CML classified as MDS.

Q. When did the term "atypical CML" first come about in the community?

A. I would say in the early 2000s.

Q. So, pre-2000, the term "atypical CML" wasn't used in the hematologic community. Fair statement?

A. Well, the illness was there. In other words, it was simply called Philadelphia chromosome-negative CML; and some may have called it atypical, but I think that the term "atypical" is -- is -- is a little bit more of a recent phenomenon.

Q. Okay. So, if we look at epidemiological literature, which we're about to start on here pretty quick, we are not going to find the term "atypical CML" used in pre-2000 studies. They might mention Philadelphia negative CML, correct?

A. Yes.

Q. Okay. So, again, we go through the year -- studies before 2000, we're just not going to see atypical CML?

A. I don't think so. I mean, I -- I hate to be held to that because some author may have used that term, but typically we -- we termed it Philadelphia chromosome-negative CML.

Q. Okay. Is it possible that Mr. Zendejas'

disease would have been called some form of myeloid dysplastic syndrome rather than atypical CML back before 2000 or even before the '82 -- 1982 MDS classifications?

A. No, not in my opinion. It might have been called atypical or myeloproliferative disease; but it would not have been called myelodysplasia.

Q. Okay. Turning to Page 5 of your report, going near the bottom there, you indicate that "the MDS classification system is fluid, primarily descriptive, and a single" classification -- I'm sorry -- a single illness may move within the classification during the -- the course of the disease, correct?

A. Yes.

Q. So, in the epidemiological literature, when they evaluate benzene as a causative agent of myeloid leukemias, do they review the course of treatment that each such patient or each such subject went through; or do they just take a snapshot and call the disease what it is at the time?

A. I think -- I'm not sure exactly what you're asking with that question.

Q. I'm saying that if we have studies, okay? And we're going to go through them. And a lot of them deal with, let's say, MDS, okay? So, they might have a person in the study who is an MDS today; but it's

possible that that person a few years down the road or even a few months down the road could very well be an AML, correct?

A. He's an MDS today but could have been an AML yesterday? I would say no.

Q. No, let me -- let me start over. That's not -- I meant the reverse of that. Let me ask a clearer question.

If someone in a mortality study, for example, or another epidemiological study is deemed in that study to be a person with MDS, okay, it is possible that a couple months or a couple years after the time, that snapshot in time, that person might have progressed to AML, correct?

A. Yes.

Q. Okay. Same question for CML. There are studies that deal with patients with CML in these piles, correct?

A. Yes.

Q. Is it likely that some patients with CML will transform to AML?

A. Yes.

Q. So, some of these people in the studies who were CMLs could have ultimately ended up as AMLs. Fair statement?

A. Well, yes; but you see, in CML, with time, the white cell count gets higher and higher; and the spleen gets larger and larger. And, so, to see somebody, let's say, who has had CML for a number of years and then goes into blast crisis and all that while the illness was undetectable and then when you saw their blast crisis they didn't have a big spleen, that would be -- it's potentially possible, but very unlikely.

Q. You agree with me, though, that some patients with CML ultimately progress to AML, correct?

A. Oh, yes.

Q. I believe Dr. Gore gave the opinion that Raul does not have MPD. Is that correct? In your review of Dr. Gore's opinions in this case?

A. I don't remember why he would say -- if he said that or why he would say that. He obviously does have myeloproliferative disease, and that's what his doctors said he had.

Q. Going through your report a little bit more, you make mention that -- on Page 6, last paragraph near the middle, you say there is no evidence that gasoline and diesel fuels are carcinogenic. You see that?

A. Yes.

Q. If someone came to you and let's say they exhibited a medical history with blood counts similar to

what you described from that gentleman in Louisiana.

A. Yes.

Q. Okay. And they were a gasoline worker. And they had evidence in the form of regular blood tests showing changes consistent with agenotoxic effect, if you will, okay? And then they told you that their exposure was to gasoline. Would you tell them, no, no way the gasoline is causing it or no way the benzene is causing it because benzene and gasoline -- I'm sorry -- because gasoline is not carcinogenic?

MR. PERRY: Object to form.

A. Well, you're asking me sort of two different questions. One is about dropping a blood count, and the other one is -- is carcinogenic. In other words, just getting a low white count is not a cancer. And if I saw someone who had a low white count and was working, let's say, in a -- in a gasoline, I'd want to know what were the circumstances? Was he sick? Did he have the flu when that white count was low? Was he taking a drug that might have influenced the white count? Does he have underlying cirrhosis and an enlarged spleen to account for the low white count? Is he an alcoholic? There would be many reasons a person could have low counts and not have it to be chemical related. So, you would work up the patient and find out why they've had

the low white count.

Q. (BY MR. PATTON) Would you agree with me that somebody could show lower white counts from being exposed to benzene via gasoline?

A. I can't agree or disagree. In other words, I don't know that. I would say that -- my understanding is that no agency in the United States -- government agency -- considers gasoline to be a known carcinogen.

Q. Alcohol causes damage to the liver, correct?

A. Yes, it can.

Q. If someone is an alcoholic, they can have damage to the liver as a result, correct?

A. Yes.

Q. Okay. Has anyone ever designated Jack Daniels, for example, as something that is known to cause damage to the liver or any given liquor?

MR. PERRY: Object to form.

A. I don't know that. It's possible, but I don't know that answer.

Q. (BY MR. PATTON) I mean, have you ever read any studies that connect the relationship between drinking alcohol and suffering damage to the liver? I mean, there's literature out there on that, correct?

A. Oh, there's a ton of literature on alcohol ingestion and liver damage, yes.

Q. Does it deal with specific brands of liquor?
A. Not that I'm aware of.
Q. Does it deal with specific percentages proof or volume of -- of alcohol in the liquor?
A. Some articles may. I -- I can't -- I'm not a liver specialist, and I don't know that, but generally speaking, no. It's the alcohol itself.
Q. Do you consider Jack Daniels to be a known cause of liver damage?
A. Well, it -- it is alcohol, and it has alcohol in it. And, so, it's a form of liquor; and heavy intake of liquor can cause cirrhosis.
Q. Okay. Whether or not some government agency calls gasoline a carcinogen, would you agree with me that benzene, because it's a component in gasoline, the gasoline is, therefore, capable of causing damage to the bone marrow? Do you agree or disagree with that?
MR. PERRY: Object to form.
A. I -- it's hard to disagree with that. All I can say is that the evidence doesn't suggest benzene causes cancer -- gasoline causes cancer, but I -- it does contain some benzene, as well as other compounds, and it might be possible to get low white counts from gasoline exposure.
Q. (BY MR. PATTON) Have you seen studies that show

that sugar can cause obesity? Is it generally accepted in the scientific community that sugar can cause --

A. Well, heavy intake of carbohydrates, yes, can cause obesity.

Q. Have you seen studies that deal specifically with Twinkies or mashed potatoes or spaghetti?

A. No, but I wouldn't be searching out those studies in my usual practice.

Q. Would you expect those studies to deal with each and every type of food in drawing the conclusion of what that food's effect or that group of foods' effect might be on -- on a person's body?

A. I'm not specifically a nutritionist and -- and, so, I don't know that literature that well.

Q. Must a person be exposed to 100 percent pure benzene to suffer -- or to -- for benzene to be a possible cause of their myeloid disease?

MR. PERRY: Object to form.

A. The answer would be no.

Q. (BY MR. PATTON) Okay. So, you respect, Doctor, that even chemicals that contain small amounts of benzene, couple percentage or so of benzene, the benzene in those other chemicals, like gasoline, is still capable of causing adverse effects on someone's bone marrow. True statement?

MR. PERRY: Object to form.

A. Again, it depends on cumulative dose and probably depends on the way the metabolism may be influenced by the associated substances.

Q. (BY MR. PATTON) You bring up an interesting point. Metabolism may be influenced by certain substances, right?

A. Yes.

Q. All human beings -- we all have different metabolism, don't we? I mean, some people metabolize food faster. You see some, you know, skinny people who eat a lot of food. Other people have different metabolism, right?

A. Yes, as a general statement, that's true.

Q. Okay. We mentioned earlier that you -- is it that you do not believe that individual susceptibility varies when talking about benzene and myeloid diseases?

A. No. I said that there is no documented evidence for that. I didn't say it's not possible; but I said that if you look at our chemotherapy data, let's say a model for chemicals causing leukemia, what you find is, in looking at large numbers of patients, is that there is a threshold with each particular chemotherapy agent; and once you get beyond that threshold, we start to see a striking rise in the number

of AML cases. Well, if there was individual susceptibility, we'd see cases of AML all along the line. We wouldn't have to wait until we got to a particular cumulative dose; but we don't see that with chemotherapy. It seems to be a cumulative dose that sets off the illness. Now, of course, you may have more cases when you get well beyond that cumulative dose.

Q. You would agree with me, though, that my body is probably different than your body in its reaction or ability to overcome certain challenges, right?

MR. PERRY: Object to form.

A. Yes.

Q. (BY MR. PATTON) We're just going to have natural differences among you and I as human beings, right?

A. Certainly.

Q. Okay. Somebody could come in here with the flu. You might catch it; I might not, right?

A. Yes.

Q. Okay. You might be exposed to -- you might smoke a lot of cigarettes. I might smoke a lot of cigarettes. One of us may or may not get lung cancer, right?

A. Correct.

Q. When we're talking about benzene affecting

someone's bone marrow, it affects the DNA, does it not?

A. Well, benzene is considered a radio magnetic drug, in that it damages DNA; but the exact mechanism of that damage, I don't know is known -- I don't know is accurately known.

Q. Nevertheless, when we talk about our body's repair mechanism, you're going to agree with me that -- do you agree with me that some individuals are going to have a stronger repair mechanism or an increased ability to go ahead and fight off the challenges that benzene might present to the body than others?

MR. PERRY: Object to form.

A. I can't say that that's certainly true. I mean, I have no evidence that it is true. I don't dispute it might be true, but I don't believe that's proven.

Q. (BY MR. PATTON) So, is that why you believe that it's got to take 40-part-per-million-year cumulative dose before any person's leukemia might be caused by benzene?

MR. PERRY: Object to form.

A. No, it's because I think there are many studies out there that suggest that it is high-dose benzene that causes -- has the potential to cause AML. And there may be subtle differences, but like chemotherapy, it's a

cumulative dose; and the cumulative dose is high.

Q. (BY MR. PATTON) But some people who receive the chemotherapy do not get AML. Others who do receive it do get AML, right?

A. Oh, yes, that is true.

Q. Okay. So, individual -- individual susceptibility is varying among that type of chemo as a cause, right?

A. Yes, that would be so.

Q. I guess I'm just not understanding from you how it is benzene is different. How -- how individual susceptibility does not vary among benzene-exposed workers. Can you explain that?

A. Well, let me see if I can explain it by giving you an example. If I anticoagulate you with a drug called Coumadin or Warfarin, that's a commonly-used anticoagulant. In the general population, for a man, it takes 7-and-a-half milligrams a day to anticoagulate you. Okay? Now, some people take 10 milligrams a day. Some people take 15 milligrams a day. Some people only take 2-and-a-half milligrams a day to become anticoagulative. So, yes, there's susceptibility. That's one part of the equation.

Now, the second part of the equation is, let's suppose I give you that Warfarin in a mixture with

other drugs. You're perfectly happy and well-anticoagulated on 7-and-a-half milligrams a day. I give you some Phenobarbital with that 7-and-a-half and suddenly the drug interactions makes your blood clotting system normal. You're no longer anticoagulated because you have two drugs together competing for metabolism. By the same token, if I give you Tagamet, which used to be a lot for ulcer disease, suddenly that 7-and-a-half milligrams of Coumadin is way too much and you're too heavily anticoagulated. And that's why if we -- if we said that benzene is the equivalent to Coumadin, it depends how you get it. In other words, are you getting it as a pure drug; or are you getting it in a mixture of compounds that can influence its metabolism, and gasoline is a mixture of many compounds.

Q. Doctor, I am going to mark as Exhibit 9, a certain study. You've been reviewing studies on benzene and leukemia for a number of years. Fair statement?

A. Yes.

Q. Are you familiar with the Hayes study?

A. Yes.

Q. Okay. I hand you what I've marked as Exhibit 9. Do you see the summary here on this front page? It talks about background. It has it in bold, and it kind of sums up the whole report. Do you see

that?

A. Yes.

Q. Do you see in the -- starting at the bottom there where it says "Results," can you read that for us?

A. For workers historically exposed to benzene at average levels of less than 10 parts per million, the relative risk for all hematopoietic syndromes combined was 2.2, confidence limits 1.1 to 4.2, and, for the combination of acute nonlymphocytic leukemia and related myelodysplactic syndromes, the RR was 3.2, confidence limits 1 to 10. For individuals who were occupationally exposed to benzene at constant levels of 25 part per million or more, the relative risk for the combination of acute nonlymphocytic leukemia and related myelodysplastic syndromes was 7.1.

Q. Let me stop you right there. This is a 1997 article from the Journal of the National Cancer Institute, correct?

A. Yes.

Q. Is that a reputable journal?

A. Yes.

Q. Is it peer reviewed, meaning other folks read these articles before they're published?

A. Yes.

Q. Is it a reliable source of information?

A. Well, as any journal is, yes.
Q. Is it something that you subscribe to?
A. No.
Q. Is it something that you choose not to subscribe to because you just don't like it?
A. No. Actually, I frequently look at it because some of my associates subscribe to it.
Q. This is a study that was conducted in China; is that right?
A. Yes.
Q. Okay. This study, if -- if we analyze what you just read, it says for workers exposed to less than 10 ppm, they still had a doubling of the risk; and it was statistically significant, right?
MR. PERRY: And, again, you're talking about the summary, not the actual article itself.
MR. PATTON: Correct, sir.
A. Yes, the summary, yes.
Q. (BY MR. PATTON) Okay. Is this a valid study? Is this study statistically significant?
A. As they say it, there are considerable argument about what the accurate measurements of benzene were, however.
Q. Okay. So, there's -- there's criticisms or challenges that one might make to this study. You can

poke some holes in it, so to speak?

A. Well, criticism such that the United States Government agencies don't accept this study as -- as accurate.

Q. Why not?

A. Because of numerous aspects about this study, not just the benzene levels. For example, this study comments about lymphomas, okay? And if you look here at -- it says "Estimates of benzene exposure were derived from work histories. Existing pathologic material and supporting medical records were reviewed to establish diagnoses of disease." I'll say that again. Existing pathological material and supporting medical records were reviewed to establish diagnosis of disease.

So, someone reading this would think that all of the cases they reported would have either slides or path -- pathologic material or medical charts. Actually, that's not so.

In the case of their lymphoma data, for example, they originally had 17 cases. They were able to get slides on four; and one turned out not to have lymphoma; so that case was dropped out. So, many of their cases, there was no slide review, in the case of lymphoma.

Q. Do you think this is a good study, or is it a

bad study?

A. It is a bad study. I mean, it has certain value because it's very large; but the study was very inaccurate. And in the case of lymphoma, for example, they have three cases in there that they have no slides, no pathology report, no medical records and the diagnosis is entirely hearsay; but you wouldn't know that from reading this article.

Q. Okay. So, there's a whole world of information beyond this article out there?

A. Yes, because this -- this benzene study has been written up many, many times by these various combinations of authors. There's a lot more available information in the literature than what you might find in this piece of paper.

Q. Okay. Are you familiar with the Adegoke study?

A. Let me see. I think I may have seen that. I -- I think --

(Exhibit No. 10 marked)

Q. (BY MR. PATTON) I marked as -- marked it as Exhibit 10.

MR. PERRY: Okay.

A. Yes. I have seen this study.

Q. (BY MR. PATTON) Okay. Before we talk about it, are you aware of any widespread criticisms or challenges

to the quality of this study?

A. I don't know much about the background of this study.

Q. Okay. You see near the top where it says "Results"?

A. Yes.

Q. It says "Significant increase in leukemia risk was observed in chemical manufacturing industry workers." Odds ratio 3.1, meaning three times as likely, right?

A. Correct.

Q. And then it shows that 95 percent confidence interval; and for that to be statistically significant, that lower number needs to be 1 or above, right?

A. Correct.

Q. And this is statistically significant, correct?

A. Yes.

Q. Do you see, reading on there, where it talks about the dose-response relationship of leukemia risk?

MR. PERRY: Is this on the front page in the summary again?

MR. PATTON: Yes, sir.

A. Yes.

Q. (BY MR. PATTON) Okay. Do you have any reason to disagree with the conclusions in this study?

A. Well, it doesn't identify at least in this abstract what kind of leukemia we're talking about. It just says "leukemia." And we know that there are many forms of leukemia that are unrelated; and in the modern era, you have to be cell-type specific.

Q. If you turn to a few -- a few pages to 487, it looks like it deals with total leukemia, ALL, CLL, AML and CML, correct?

A. Yes, I see that.

Q. And you said that for a study to be valid in the modern era, it needs to deal with cell type?

A. It needs to be cell-type specific. In other words, CML as distinguished from AML as distinguished from ALL as distinguished from -- from --

Q. Is this study cell-type specific?

A. They do give different numbers here.

Q. Okay. And this is --

A. That's the distribution of the cases.

Q. And this is August 2003, right?

A. Yes. They're giving us the distribution of the cases, but --

Q. Do you see on that right-hand column on 487 where it talks about "the odds ratios"?

A. Yes.

Q. Would you agree with me that this study

supports a relationship -- a statistically significant relationship between benzene and these forms of leukemia?

MR. PERRY: Are you talking about Page 487 or Table --

MR. PATTON: 487.

MR. PERRY: -- 1 or Table 3?

MR. PATTON: Page 487.

A. It says "The ever exposed category had a significantly increased risk for CML and a non-significant increase for ALL and AML."

Q. (BY MR. PATTON) And then going to the left-hand column, it shows a risk for leukemia that was increased significantly -- significantly among those who worked in the chemical manufacturing industry. It is statistically significant and shows a three times increase in the risk, correct?

MR. PERRY: Object to form.

A. Again, they talk about leukemia as a general category.

Q. (BY MR. PATTON) And you just don't believe that's fair?

A. Well, it has to be broken down to the type.

Q. Why does it have to be broken down to the type?

A. Because acute -- because myeloid leukemias and

lymphoid leukemias are -- they're different cells. It's like comparing kidney cancer to lung cancer. I mean, they're different cell lines.

Q. But within the -- within the myeloid leukemias, is it your testimony here, that for a study to be meaningful, it has to be split among the 16 or so differentiations you have on Exhibit 8?

A. Oh, you're talking in terms of AML?

Q. I'm talking in terms of myeloid leukemias.

A. I would say that it would be inappropriate to lump myelodysplasia, acute myeloid leukemia and chronic myeloid leukemia in the same ball of wax.

Q. Okay.

A. They're different illnesses.

Q. What was the word you used? How would it be?

A. I said it would be inappropriate.

Q. Inappropriate. Okay.

One of the studies that you brought with you today, and it looks like you've marked it -- penciled in -- as Exhibit 30 -- Reference 30 to your report, and I will mark it as Exhibit 11.

(Exhibit No. 11 marked)

Q. (BY MR. PATTON) And this appears to be a 2007 mortality study of Texas Petroleum Refinery and Chemical Employees, 1948 to 2003; is that right?

MR. PERRY: Who is the lead author on that?

THE WITNESS: It's T-S-A-I.

Q. (BY MR. PATTON) Tsai.

MR. PERRY: Okay.

A. Tsai.

Q. (BY MR. PATTON) Okay.

A. And it's actually my Reference 30.

Q. Okay. It's your reference. That's something you're relying on in your opinions to say that benzene played no role in Raul's leukemia, right?

A. Actually, no. In other words, this -- this is a general piece of information. In other words, my letter covers more than just atypical CML. This -- this -- I don't remember what the sentence was that I referenced this in, but I think it had to do with the fact that increased incidences of -- of leukemias have not been seen commonly in the -- in the petrochemical industry for many years.

Q. That is exactly what you cite it for.

Doctor, on the front page, it says who paid for that study; is that right? In the lower left-hand corner there?

A. It -- well, it says -- no, it doesn't say it in those terms; but it says "From Shell Health Services,

Shell Oil Company, Houston, Texas."

Q. Do you think Shell paid for that study, or do you think somebody else did?

A. I have no idea who paid for this study.

Q. Well, why is Shell's name on it? Do you know?

A. I don't know. It may be that the person who did the study worked for Shell.

Q. And you believe that that study supports the -- what does that study stand for?

A. Well, looking at the "Observed" and "Expected," they had AMLs. They had observed 11, expected 12.16. And then putting it as a category of acute nonlymphocytic, they had observed 12, expected 12.41.

Q. Okay. What is "acute nonlymphocytic"?

A. Well, it's -- it's basically the same as AML. It's just that there are some cases that you're -- are harder to tell that it's -- it's AML or if it's an undifferentiated leukemia --

Q. Well, what about --

A. -- and you can't categorize it very well.

Q. I didn't mean to interrupt you. What about on your Exhibit 8? Are those all ANLLs, those diseases?

A. Those are AMLs we're talking about.

Q. Not in Exhibit 8, sir. The chart we made?

A. Well, I've got a column of AMLs.

Q. And you've got a column of MDSs?
A. MDSs, yes.
Q. And you've got CML, atypical CML?
A. Yeah.
Q. Okay.
A. And myeloproliferative neoplasms.
Q. Are those all ANLLs, everything on that chart on your left hand?
A. No. That term would only -- no. That term isn't on this. That's simply the AMLs plus a couple of cases that you're hard pressed to tell whether they're AML or ALL. They're undifferentiated leukemia.
Q. Is MDS a form of ANLL?
A. No.
Q. No?
A. No.
Q. Isn't MDS a myeloid leukemia?
A. No. MDS is a -- you might say is a preleukemia syndrome, potentially preleukemic. If you have MDS, you don't have AML. If you had AML, you'd have AML.
Q. Well, doesn't the exhibit -- the Shell study that you have there, doesn't that lump all ANLLs together?
A. No, no, no.
Q. And it lumps all AMLs together, right?

A. It's got AMLs; and it's got CML as a separate category, three observed and 4.5 expected. It's got lymphoblastic, or ALL, 3 observed; 1.8 expected. And chronic lymphocytic leukemia, 9 observed; 7.8 expected. So, it breaks them down as to types of leukemia.

Q. But it lumps all the AMLs together, doesn't it?

A. It lumps all the AMLs together, yes.

Q. It doesn't differentiate between the M1 to M6, right?

A. That's correct.

Q. Well, isn't -- isn't it inappropriate to lump them all together? Isn't that what you said ten minutes ago?

A. Well, not at the time -- no. Even today they're typically lumped together. Ideally, they would be separated. That's the gold standard these days. But this paper is written some years ago.

Q. I'm going to show you what I'll mark as Exhibit 12, and this is an article by Nilsson, in 1996, "Genotoxic Effects in Workers Exposed to Low Levels of Benzene from Gasoline."

(Exhibit No. 12 marked)

Q. (BY MR. PATTON) Have you ever seen this study before?

A. I don't think so.

Q. If you look in -- in the -- on the top in the summary of this study, it says "Multiple linear analysis adjusting for smoking habits showed a significant association between the exposure level of benzene during the shift and the increase of 80HdG," which is a large word that I won't say or attempt to say for the court reporter's sake -- "in the urine over the shift among exposed workers."

And I'll represent to you, Doctor, that this study looks at the amount of benzene or its metabolites detected in urine while workers were exposed to benzene from gasoline. Does that seem accurate to you based on what you --

A. I have no reason to dispute that.

Q. Okay. Is it your opinion that benzene and its metabolites can be detected in urine while people are working with benzene?

A. Yes.

MR. PERRY: Object to form.

Q. (BY MR. PATTON) Okay. So, you would agree with me that urine tests are a possible useful tool in determining the level of benzene with which someone might be exposed to during a given day?

A. Yes. It has to do with the timing of the test. In other words, if you took the test while they're in

the process of working, it would be more accurate than if you took it the next day.

Q. Okay. So, if all of us, instead of working in this conference room today, we go work at a refinery where they're making gasoline and where they're using benzene, okay, people could come in, take a urine test from us and they could determine the amount of benzene or its metabolites in our body at that given moment, correct?

MR. PERRY: Object to form.

A. I don't know if you could accurately determine the concentration of benzene by the metabolites. That's beyond my expertise, but you could detect likely that there was some exposure to benzene.

Q. (BY MR. PATTON) Do you see in the lower right-hand corner, that sentence -- or paragraph beginning "A common"? It says "A common occupational source of exposure to benzene is handling of gasoline."

A. Yes.

Q. Do you agree with that?

A. Yes.

Q. Do you have any reason to disagree with that?

A. I have no reason to disagree with that.

Q. Turn to Page 319 of this study.

MR. PERRY: Is this Exhibit 11?

MR. PATTON: Yes.

MR. PERRY: Okay.

MR. PATTON: Might be 12.

MR. PERRY: Exhibit 12?

Q. (BY MR. PATTON) What -- what exhibit did I put on there?

A. Twelve.

Q. Twelve.

MR. PERRY: Twelve. Okay.

Q. (BY MR. PATTON) Doctor, see on Page 319 under "Exposure"?

A. Yes.

Q. Okay. Can you read that for us?

A. 319 under "Exposure." Oh. The concentration of benzene, 8 hour time-weighted average, in the breathing zone of the exposed workers was 0.13 part per million, mean value 003 to 0.6, during the shift. The mean exposure to benzene among controls was .002 part per million.

Q. So, these are men who are working with gasoline; and the amount of benzene in the air is .13, right?

A. Yes.

Q. But benzene levels can still be detected in their urine even at that low level, correct?

A. Yes.
Q. Do you have any reason to disagree with that?
A. No.
Q. Okay. If someone was being exposed to, let's say, ten times as much benzene from gasoline or from any other operations, would you agree with me that the more benzene they're exposed to, the more detectable it would be in the urine?
MR. PERRY: Object to form.
A. That would likely be true.
Q. (BY MR. PATTON) Okay. If you -- if you increase the amount of exposure, you'll increase the amount of benzene output. Fair statement?
MR. PERRY: Object to form.
A. Well, yes.
Q. (BY MR. PATTON) Are you familiar with the Guènel study?
A. No.
MR. PATTON: I'll mark this as Exhibit 13.
(Exhibit No. 13 marked)
Q. (BY MR. PATTON) This is a 2002 study by Guenel. Have you ever seen this study before?
A. No.
Q. Have you read that front page?
A. I read the front page, yes.

Q. It shows the risk of leukemia increasing at 3.6 times what is expected for those workers exposed to benzene above 16.8 ppm years.

Did you see that?

A. Yes.

Q. And it also shows that there was an indication of a dose-response relation, odds ratio 1.2 -- that means 1.2 times more likely -- and that is statistically significant -- per 10 part-per-million years increase in exposure.

Do you see that?

A. Yes.

Q. Okay. And it shows that "The link with benzene was more pronounced for acute leukemia than for chronic leukemia, but no association with a particular cell type was apparent."

This study, would you agree with me, supports the -- the theory that even lower doses than 40 ppm-year cumulative dose have been shown in the literature in statistically significant numbers to increase the risk of myeloid leukemia. Do you agree with that?

MR. PERRY: Object to form.

A. Just a minute. I'm looking at their acute myeloid leukemia here and it says -- I'm looking at

their Table IV. And under acute myeloid leukemia, it says the confidence limits at greater than 5.5 are .7 to 8.5. So, that would be not statistically significant. And the same would be true for chronic myeloid leukemia.

Q. (BY MR. PATTON) But do you see in Table IV where it says "All acute leukemia," greater than 16.8 PPM years?

A. Yes, but they don't tell you what kind of leukemias they're talking about. It just says "All acute leukemias." So, they've lumped -- they have a very low number of cases, six cases. So, it's a small study; and they don't tell you what kind of leukemia they got.

Q. Are you critical of this study because it doesn't show what type of leukemia?

A. Well, that particular category. In other words, all I see is when we get down to acute myeloid leukemia, I don't see anything statistically significant, at least in that Table VI. I see all acute leukemias; and when you've got tiny numbers like that, sticking in one case of ALL or two might totally change the statistics.

Q. Well, isn't that the same thing that happens with some of the studies that you're relying upon?

A. I don't think so. I think I try to use

cell-type-specific studies.

Q. Okay. Exhibit 14, this is a paper by Wong, 1993. This looks like it's been copied and restapled more than once. You're familiar with this, right?

(Exhibit No. 14 marked)

A. Yes.

Q. (BY MR. PATTON) Does that split it down by subtype, or does it lump them altogether?

A. It says, for the two cohorts combined, standard mortality rate for acute myeloid leukemia was 1117.1. So, that looks like it's specific for AML.

Q. Don't other parts of the conclusions, though, lump them together?

A. Well, he has another table in here that puts all lymphato -- hematopoietic cancer together, which today would be, I think, inappropriate because you're putting apples and orange -- apples and oranges together; but when you're speaking of acute myeloid leukemia, that's very specific.

(Exhibit No. 15 marked)

Q. (BY MR. PATTON) Well, you have another study here, Doctor, from Graff?

A. Yes.

Q. This looks like Reference 34?

A. Right.

Q. I just put the sticker over the year. So, I don't know what year it is.

MR. PERRY: 2005.

Q. (BY MR. PATTON) This lumps together lymphohematopoietic cancer, right?

A. Yes.

Q. Doesn't that include both lymphoid -- or lymphatic cancers and myeloid leukemias like we have on Exhibit 8?

A. It does; but in the text, he breaks it out by cell type.

Q. Does he break it out by -- well, first of all, are MDSs included with AMLs in this -- in this study?

A. No.

Q. They are AML only, correct?

A. Well, there's -- I think there's more than AML in the study, but -- but MDS, I don't believe, is part of that study.

Q. Did this study by Graff go through and determine which of these folks in the study with AML actually went through atypical CML or went through an MDS phase?

A. No.

Q. Can you point me to any study that you're relying upon in your opinions that benzene played zero

role in Raul's leukemia, can you point me to any studies that track the disease progression that a given subject went through before he was called an AML?

A. Well, the M.D. Anderson articles do that.

Q. Okay. Any others?

A. Well, that -- that comes to mind. I would have to look to see what I referenced under that; but, in other words, the -- in the M.D. Anderson study, they show the natural history of the illness because they classify all their people and then they follow them until death.

Q. Doctor, what I have given you is the stack of all the other studies you're relying upon supporting your opinion that benzene played no role in Raul's leukemia. Is that the complete stack there?

A. That -- yeah, whatever all I brought with me, yes.

Q. And what else we've marked as exhibits?

A. And what else you've marked as exhibits.

Q. And my question for you, Doctor, is: Please pull out each and every study in that stack that tracks the disease progression that a given AML subject went through before he was called an AML in the study.

MR. PERRY: Object to form.

A. Well, in the -- in the M.D. Anderson study,

they discuss -- I believe it's -- well, let me see if I can find it in here. They tracked 189 patients and they were carefully studied and at the time of diagnosis all they had was Philadelphia chromosome negative CML. And then they studied these people to see how many developed AML; and I believe they found, let's see, blast transformation -- blast transformation of disease preceded death in 8 of 26 patients for whom the cause of death was known, 31 percent. It also says patients were documented with a myeloid phenotype. The median time from referral to blast crisis from the date of referral was 11.5 months.

So that in this large group of patients, probably one of the largest, if not the largest reported, all of these people didn't have acute leukemia when they were seen and they followed them and they developed blast crisis, many of them, and died.

Q. Doctor, my original question was a little bit different. It was about benzene as a cause. Does that study in your hand deal with benzene as a cause?

A. I see. No, it does not deal with benzene as a cause.

(Exhibit No. 16 marked)

Q. (BY MR. PATTON) Okay. And I'll mark that, in fairness, as Exhibit 16. And my question, sir, was:

Can you point us to any studies in your stack, anything that you're relying on in this case in giving your opinion that benzene played no role in Raul's leukemia?

A. Yes.

Q. Can you point us to any other studies that talk about the relationship between benzene and AML or any other form of leukemia where they tracked the patient's disease progression?

A. Well, this is a discussion, this article, my Reference 3; and it discusses the whole category of myelodysplastic/myeloproliferative neoplasms and points out these are all myeloproliferative diseases. And it says the etiology of this category of illness is not known. And when it says that it means it's not known it was caused by Twinkies or gasoline or benzene. The etiology is unknown. And, so, that's a pretty straightforward statement.

(Exhibit No. 17 marked)

Q. (BY MR. PATTON) Did they perform a study, in this Exhibit 17 by Orazi, did they perform a study to examine the relationship between benzene and any of these diseases?

A. No. This is a review of the literature by these gentlemen and a review of this particular disease classification.

Q. Just to go back through my original question, sir, is this a study that talks about benzene as a cause of leukemia which tracks a patient's disease progression before it becomes AML?

MR. PERRY: Object to form.

A. It doesn't do that.

Q. (BY MR. PATTON) Okay. So, that's -- you're 0 for 2 now. Are there any other studies in your stack there which -- which talk about the relationship between benzene and leukemia and track a patient's disease course?

MR. PERRY: That's a different question than you initially started asking him.

THE WITNESS: Yeah.

MR. PERRY: So, just -- you've changed the question during this course, so now you're asking a completely different question. Because early on you weren't including the issue about benzene and the progression of something to AML.

Q. (BY MR. PATTON) Let me make it clear, sir. What I want to know is -- and here's the point I'm trying to make and the question I'm trying to get answered. I understand that there's a relationship between benzene and AML. You acknowledge that, correct?

A. I acknowledge that, yes.

Q. Okay. Now, my question is: Is before some of these subjects in the study who are -- are recognized as a benzene-induced AML, before they become AML, do any of these studies track their disease progression, whether it was MDS or atypical CML?

MR. PERRY: Object to form.

A. I'm still not exactly understanding your question. In other words, if I take people who have a -- I think what you're saying is, if I take people who have atypical CML, can I go back in time and see when they had normal blood counts and what they were exposed to? Well, of course not. In other words, they come in with a particular illness and you make that diagnosis and you don't find any evidence of AML and then you follow them until they're dead.

Q. (BY MR. PATTON) Sir, that's not my question at all.

A. I'm not understanding your question, then.

Q. And I want to get on the same page with you here, okay? Some of these charts that we've reviewed in some of these studies, they deal with patients who have AML, right?

A. Yes.

Q. Okay. And they talk about benzene as being a cause of someone's AML, correct?

A. Yes.

MR. PERRY: Objection. They don't talk about there being a cause. They're looking at odds ratio. They don't make a statement about being a cause of any specific AML. That's not true. That's not what the studies say.

Q. (BY MR. PATTON) Doctor, would you agree with me that some of the studies that you've relied upon today examine the relationship between benzene and AML? Fair statement?

A. I think so, yes.

Q. Okay. Would you agree with me that some of those studies take a look at how much people were exposed to benzene and how many people got AML, as compared to the general population? Isn't that sort of what these studies are doing?

A. Some of them, yes.

Q. Okay. And some of these studies, when they compare the numbers, they might show a -- a statistical significance that there are more AMLs among benzene-exposed workers than normally expected in the general population, correct?

A. Yes.

Q. Okay. So, that's the point of some of these studies, to examine the relationship between benzene and

leukemia by looking at benzene-exposed workers in comparison to the general population. Fair statement?

A. Yes.

Q. Okay. In each such study which goes through what we just talked about here in the last 90 seconds, okay, for those patients who are -- who are designated as AML, okay, my question for you is: You acknowledge that sometimes people might have MDS and it progresses to AML. True statement?

A. Yes.

Q. Sometimes people have atypical CML which progresses to AML. Fair statement?

A. Yes.

Q. Okay. My question, sir, is: Of any of the AMLs examined in these studies, do the authors of those studies show what disease progression the person went through before they had AML? For instance, does it show that, you know, AML No. 6 actually had another disease before it?

A. I don't know that that's true of any of these studies; but I would point out that most people, if they had a patient with CML, for example, and they went into blast crisis, they wouldn't put that into a study as an AML. They would put it in as a CML.

Q. Do the criteria of each of these studies tell

us why they're calling someone a -- an AML as compared to a CML, or would you agree with me that some of the AMLs in some of these studies are probably blast crisis AMLs?

MR. PERRY: Object to form.

A. I think it's very unlikely that more than an extraordinarily rare case would be a blast crisis of AML in these studies.

Q. (BY MR. PATTON) And what's the basis for that opinion?

A. Because of the fact that when a blast crisis occurs, it's a very recognizable illness, especially if it's in the setting of a CML; and it would simply be classified as blast crisis of CML on the death certificate. It wouldn't be AML. I think that what you're suggesting can rarely happen, that a person -- because I've seen this before -- a person comes in and they have a positive Philadelphia chromosome and AML and you're left to wonder, well, did they really used to have CML and now they've got AML? Or does this happen to be a case of AML with a Philadelphia chromosome? And actually, many times it is AML with a Philadelphia chromosome. They didn't have the chronic leukemia. We see that very commonly in acute lymphoblastic leukemia, where a large number of people have a Philadelphia

chromosome, that's a causative factor in ALL; but it's not a case of CML. They happen to have the Philadelphia chromosome.

So, I think what you're suggesting would be highly unlikely to make up any more than a tiny percentage of these cases.

MR. PATTON: Objection, nonresponsive.

Q. (BY MR. PATTON) Sir, do you have any studies which examine the relationship between benzene and blast crisis CML?

A. No.

Q. Do you have any studies which -- which examine the relationship between atypical CML and benzene exposure?

A. No.

Q. Do you have any studies that examine the relationship between CMML and benzene exposure?

A. Not that I have here today, but that is -- there are such studies out there.

Q. Are there any studies with you today that examine the relationship between myeloproliferative disease -- you said Raul had MPD, right?

A. He has MPD, yes.

Q. Do you have any studies which examine the relationship between benzene exposure and MPD?

A. Not to -- not of these studies.

Q. So, in giving your opinions here today that benzene played no role in Raul's leukemia, you chose to bring with you no studies examining his specific type of leukemia with benzene exposure. Fair statement?

MR. PERRY: Object to form.

A. No. That would be false. I've brought studies on the specific illness he has, and these studies indicate that illness is of cause unknown. That means not caused by Coca Cola, not caused by Twinkies, not caused by benzene. Because, for example, in the case of the World Health Organization, if you look at their section under myelodysplasia, you'll see comments about that that illness may be caused by high exposures to benzene. When you look at their section here on atypical -- AML, there is no etiology because none is known; and that would mean that it's not Coca Cola; it's not Twinkies; it's not sugar; it's not benzene.

Q. (BY MR. PATTON) And would you --

A. It is unknown.

Q. Would you agree with me, Doctor, that part of the reason why etiology is to some extent unknown for some patients is because doctors like yourself aren't asking the questions enough?

MR. PERRY: Object to form.

A. No. I think that's totally false, because if you look, for example, at Dr. Aksoy's study, he studied a huge number of patients, about 28 or 29,000 people. And he was a hematologist trained in the United States. He looked at all the slides. He classified the patients, and he commented that there were no patients with the phenotype of chronic -- one patient -- with the phenotype of chronic myeloid leukemia among these benzene-exposed subjects. And to me that is significant and suggests that high level benzene exposure does not cause a CML-like illness, whether it's primary CML or atypical CML.

Q. Well, let's talk about CML-type illnesses.

Are you familiar with a paper by Dr. Myron Mehlman about CML?

A. I think I've seen that.

MR. PATTON: I will mark as Exhibit 18, Mehlman, 2006.

(Exhibit No. 18 marked)

Q. (BY MR. PATTON) Have you seen this study before?

A. I have seen it recently, yes.

Q. Can you read for us on the front page there, in the middle of the paragraph, under "Abstract," where it says "A review"? Can you read that for us?

A. (Reading) A review of the epidemiologic literature on workers exposed to benzene or benzene-containing solvents and products shows, without question, that this exposure is significantly related to other types of leukemia and lymphoma.

Q. Continue.

A. "In this article, we review the literature on the relationship between benzene exposure and chronic myelogenous leukemia (CML) and find that benzene and benzene-containing products are significantly related to morbidity and mortality from CML."

Q. And if you turn a few pages, you see -- you've read this report before, right?

A. Not in detail.

Q. If you turn to Page 112, it references a previous study by Yin, which found a significant excess of CML in benzene exposure. Do you have any reason to disagree with that?

MR. PERRY: To what Yin said or what Mehlman says Yin says?

MR. PATTON: What Mehlman says Yin says.

MR. PERRY: Okay. Because there's a difference.

A. The Yin article, I think, is in -- in the -- in the background of what your other expert said, and Yin

says there's only an increase in AML. But I can read you what he says here. He says -- Infante -- looking at data from benzene-exposed workers in China between the year 1972 to '81 previously reported by Yin found a significant excess of CML in benzene-exposed workers.

Q. (BY MR. PATTON) If you turn to Page 114, this is in the Annals New York Academy of Sciences. Is that a reputable journal?

A. It's a -- it's a journal. Sometimes the articles are not peer reviewed, they're invited, but what is it that you'd like me to --

Q. Well, is it a reliable source? Is this study reliable?

A. Well, I don't -- I haven't read the source, but I've seen good articles and bad in this particular journal.

Q. On Page --

A. But it is a journal. Go ahead.

Q. On Page 114, he references that "A number of other studies have shown increased risk of CML from exposure to petroleum products containing benzene." And he goes on to cite and talk about a handful of studies. And then near the end there, he references a study by Linet, which shows a 1.5-fold excess of CML revealed for motor mechanics, who were exposed to gasoline.

Is it your testimony today, sir, that there is no reliable scientific evidence connecting benzene exposure and CML?

A. My opinion, based on the extensive studies by Dr. Lichtman on the subject, who I think I referenced, that there are no consistent information linking CML to benzene exposure and the prevailing opinion in the medical community based on the scientific peer-reviewed literature and what is taught in textbooks and what is taught in medical schools is there is no relationship between CML and benzene exposure.

Q. You would agree with me, however, that there are a handful of studies out there, such as the Mehlman article which reviews some of these studies, which does show some support for that theory, correct?

A. Well, it depends on what you say. For example, he's reading from what he says here. The Chinese cohort study of Yin reported an imprecise 2.5 excess risk for CML and exposures to benzene, confidence levels 0.7 to 16.9. So, most people would say that's a nonsignificant study. It proves nothing.

Q. The point I'm trying to make, Dr. Natelson, is that certain patients with AML, they had CML before they had AML, right?

A. It's a very rare circumstance; but, yes, that

is true.

Q. Do you agree that all forms of acute myelogenous leukemia first go through a chronic phase, or is that just not the case?

A. No. In fact, it's just the opposite. About 90 -- 85 to 90 percent of AML is de novo AML, meaning it's of abrupt onset. And there's no prior myelodysplastic or abnormal hematopoietic phase. The remainder are secondary and there may be MDS or myeloproliferative disease or chemotherapy or abnormal blood counts, but the vast majority of leukemia off the street is a sudden onset.

Q. But, in fact, the studies dealing with benzene-exposed populations, compared to the general populations, when they deal with AML, they do not necessarily look at the complete disease progression or disease picture of a given patient when drawing the conclusions in their studies. Fair statement?

A. Well, you have to look at a particular article. I mean, some articles are based on death certificates. I mean, there are a lot of different types of articles. And I think early on in the deposition I mentioned one about erythroleukemia, in which they looked at some of these things you're talking about. But, again, you have to look to individual studies; and what's out there, my

charge, as a testifier, is to relate what is the prevailing medical opinion in the scientific medical community, and the prevailing opinion, based on numerous articles, is that the only known cause of chronic myeloid leukemia is radiation exposure.

MR. PATTON: Objection, nonresponsive.

Q. (BY MR. PATTON) Sir, I did not ask you about the cause of chronic myelogenous leukemia.

A. All right.

Q. I did not ask you about radiation exposure.

A. All right.

Q. Here's my question. If you give me an answer, we can take a break.

In all the studies that you have with you today, okay, that examine the relationship between AML in the general population, compared to AML in benzene-exposed workers, do any of those studies track a person's disease course, that's to say, showing that he had CML before AML or he had MPD before AML or he had MDS before AML? Can you point us to any studies that make that type of critical analysis of disease progression before they call someone an AML?

A. Let me just see. I mean, I can think of one that might say that. Just see if I happen to have that referenced here.

Well, I have one article on therapy-related leukemia; but it doesn't specifically get at the percentages that you're after. There are such articles out there, but I have not referenced one here.

MR. PATTON: Let's take a break.

THE VIDEOGRAPHER: Now going off the video record. Approximate time is 2:25.

(Recess taken from 2:25 to 2:37.)

THE VIDEOGRAPHER: Now back on the video record. Approximate time is 2:37.

Q. (BY MR. PATTON) Doctor, we took a short break and I just want to round out some of what we were talking about and then I want to go to a new topic.

A. Good.

Q. Okay?

A. Okay.

Q. But just to round it out just so I'm clear.

A. All right.

Q. When -- when this case goes to trial, I won't have the benefit of -- of having any additional documents or studies that you might rely on in forming your opinions, okay? So, I just want to make sure we have everything in front of you today that we're going to go through that support your opinions, okay?

A. Yes, that's true.

Q. Okay. If -- first of all, have you brought any studies with you that specifically examine benzene as a causative factor of atypical CML?

A. No.

Q. Okay. And you wouldn't expect to see those studies because they weren't really calling it atypical CML until around 2000, right?

A. Well, but I think that -- that it would have been called either CML unclassified or CML Philadelphia chromosome negative. In other words, it would have been lumped in with CML cases.

Q. Did you bring with you literature today that shows benzene doesn't cause CML?

A. I think the Aksoy study I referenced suggests that.

Q. Okay. The Aksoy study supports your conclusion that benzene is not connected with CML?

A. Yes.

Q. Or not -- benzene doesn't cause CML.

Would you agree with me, however, that there are some studies, including those referenced by Mehlman, which do show some association between benzene exposure and CML, whether or not they're statistically significant, whether or not it's accepted in the

textbooks, but would you agree with me that there are studies supporting a causative relationship?

A. Yes.

Q. Doctor, have you brought with you any studies that examine benzene as a causative factor when you -- when you look at someone's disease through the road of MDS, then on to AML; or atypical CML, then on to AML? And what I'm trying to ask in maybe a different way is: When we look at these studies, we're looking at a snapshot of that person's disease in time. Fair statement?

A. Yes.

Q. If we examine, like, the Strom study, which we're going to talk about in a minute, it deals with certain MDS subtypes. And you agree with me that the epidemiology -- epidemiological literature you've brought with you today and the EPI that deals with benzene and leukemias, any leukemias, those studies take a snapshot of the person's disease. Fair statement?

A. Yes.

Q. In the case of AML studies, okay, related to benzene exposure, those studies take a snapshot at what is essentially the end of the disease, right? You don't go from AML, then back down to a different disease, on Exhibit 8, do you?

A. No. Once you have AML, that becomes an end-stage disease.

Q. AML is an end-stage disease, right?

A. Yes.

Q. Okay. So, if you're dealing with a study that examines MDS, it's possible that the MDS individuals in the study could progress to AML, right?

A. Yes.

Q. But it's not going to go back from AML because it's an end-stage disease?

A. Yes.

Q. Okay. Would you agree with me that none of the studies supporting your opinion that benzene played no role in Raul's leukemia, you have not brought with you any studies today which track the course of atypical CML through to AML in the context of causation. Fair statement?

A. In the context of causation, that would be true.

Q. Okay. And if Raul -- well, first of all, the people who perform these studies, they're not all medical doctors, are they?

A. Which studies are we talking about? Epidemiologic studies?

Q. All the studies we have on the table today.

A. Well, sometimes they're a mixture of doctors, pathologists, clinicians, epidemiologists and so on.

Q. And I think you mentioned earlier that there was a -- one of your colleagues -- or a hematologist at a certain university that might always call a certain disease a certain type, where others might call it a different type, right?

A. Yes.

Q. What was the example you gave?

A. I'm trying to remember what I -- what I said about that. I don't remember saying exactly that. I don't remember what I said, but I -- I think I may have said that some people would call blast crisis -- most people would call blast crisis blast crisis. Some might call it acute leukemia.

Q. Okay. So, some people, on death certificates, for the AML patients, in some of these studies, okay, once those people have passed away, there's a death certificate created, right?

A. Yes.

Q. Okay. And then somebody calls it cause of death; and they could call it blast crisis, or they could call it AML, correct?

A. Yes.

Q. If Raul were to die, on his death certificate,

would it be feasible for a medical professional to call it AML, given his current disease stage?

MR. PERRY: Object to form.

A. It -- it might happen because the person that signs the death certificate oftentimes is not the person that's taking care of the patient.

Q. (BY MR. PATTON) Okay. And you would agree with me that when we go through all these studies here on the table and all the studies you're relying on in your opinions in this case, you cannot tell me with any degree of certainty whether some of those AML patients weren't eventually like what Raul may be, someone who went through atypical CML and ended up with AML?

A. I can't tell you that with certainty; but I would believe, based on my experience, that that would be a very rare event.

Q. Atypical CML by its nature is a very rare event, isn't it?

A. Yes.

Q. Who would you normally expect to get atypical CML?

MR. PERRY: Object to form.

Q. (BY MR. PATTON) People of a certain age or people of a certain race? Are there any factors that you see in most atypical CMLs?

A. Well, there's a wide age range. I think in the -- in the M.D. Anderson study, they have cases as young as -- as 24 and -- and then some probably in the 70s and 80s. I think their mean age was in the 60s. It's a little older than the mean age of standard CML.

Q. Raul was, like, 28 years old when he was diagnosed?

A. Yes.

Q. Is that right? Less than half of the age of 60?

A. Yes, but as I say, they had cases as young as age 24.

Q. Doesn't that support the conclusion -- or not the conclusion -- but the possibility that more likely than not, his disease was caused by something, as compared to de novo or endogenous?

MR. PERRY: Object to form.

A. I -- I think it doesn't tell you that. In other words, we don't know the cause for this illness; and we don't know if it might have been something congenital that didn't show up until he was 24. We don't know if it was caused by an external agent. We don't know if it was endogenous. But we do know that when we study the -- the large number of these patients, as M.D. Anderson studied, there is no known etiologic

factor.

Q. (BY MR. PATTON) You brought it up again. Did M.D. Anderson specifically examine the relationship between benzene exposure and atypical CML?

A. Not -- not that they say in that paper.

Q. Did they examine the relationship between chemo treatment and atypical CML?

A. Not that they say in the paper.

Q. Smoking and atypical CML?

A. Not that they say in the paper.

Q. Radiation and atypical CML?

A. Not that they say in the paper.

Q. Doctor, I'm showing -- well, I just -- I want to close this out, and then I'll hopefully move on to the new target -- or new topic.

So, in forming your opinions today, is it accurate to say that you can't bring me a single study which examines Raul's specific disease type. Instead, in forming your opinions, you have to put together these other multiple pieces of studies, so to speak, in drawing your conclusion of benzene played no role?

MR. PERRY: Object to form. Misstates his testimony.

A. Well, I think that that's not a correct way to phrase it. For example, in the case of M.D. Anderson,

if you study any patient they work up for leukemia, there is always a long, dictated history and physical, in which they go into their smoking history, any evidence of any prior myelodysplastic disease, any evidence of this and that, their alcohol history. They have very extensive histories and physicals. There's no reason to think that when they came across an atypical CML patient, they would suddenly not do that and take a different kind of history and physical and omit all of those data.

So, I have every reason to believe that all of those patients that they reported were questioned intensively; and if they felt there was an etiologic factor, they would put it in their report.

Q. (BY MR. PATTON) Where is this report you're talking about?

A. That's probably -- is it this one? No, I don't think so.

Q. Is this it?

A. That's it, yes.

Q. Okay. Let me take a look at it.

MR. PERRY: Which reference number is it?

MR. PATTON: Exhibit 16, Reference 4.

A. Is that the one? Yeah, it must be. Dr. Kantarjian is on it?

Q. (BY MR. PATTON) Yes.

MR. PERRY: So, the lead author is Onida, O-N-I-D-A?

THE WITNESS: Yeah.

MR. PERRY: It's also Reference 5.

Q. (BY MR. PATTON) Doctor, I've just reviewed Exhibit 16, and granted, I did it rather quickly; but there are two words I didn't see appear anywhere in this study. Word one is cause; and word two is benzene. So, I don't see where this study even examines cause. Am I wrong?

A. Well, what I'm telling you is -- you're -- what you're suggesting is that when an M.D. Anderson doctor encounters a patient with this illness --

Q. Dr. Natelson --

A. -- they change their way of doing a history and physical.

Q. Let me stop you right there. I'm not asking you or suggesting anything. I am asking you whether this study, Exhibit 16, regardless of what the M.D. Anderson doctors do or don't do, my question is this: Where in here does it examine cause?

A. I think I've -- I've said before, it does not; and does not mention benzene.

Q. Okay. Thank you.

New topic.

A. All right.

Q. I'm going to mark as Exhibit 19, the Strom study. You're familiar with the Strom, 2005, M.D. Anderson study?

A. I have two of her papers. One, I think, more recent than that. Let me see if it's the one I'm thinking of.

Q. This one does examine cause?

A. Yes, I am familiar with this study.

(Exhibit No. 19 marked)

Q. (BY MR. PATTON) Can you turn to Page 1915, Table 3?

A. 1915, Table 3.

MR. PERRY: This is Strom, "Risk factors of myelodysplastic syndromes: a case-control study"?

MR. PATTON: Yes, sir.

Q. (BY MR. PATTON) And, Dr. Natelson, preliminary, okay? I recognize that you do not consider Raul's disease to be an MDS, right?

A. That's correct.

Q. Okay. Would you agree with me, though, that Table 3 -- well, MDS is a form of myeloid disease. It is a myeloid leukemia, so to speak, correct?

MR. PERRY: Object to form.

A. It's not a leukemia. It is a myeloid disease.

Q. (BY MR. PATTON) It's a bone marrow disease, right?

A. It's a bone marrow disease.

Q. Okay. This study at Table 3, you see the category "Benzene/solvent/gasoline"?

A. We're talking Table 3. I see "Family history," "Smoking," "Alcohol," "Fertilizer/pesticide," "Benzene/solvent/gasoline," yes.

Q. Okay. And it shows for the high exposure category, it shows a doubling of the risk; and it is statistically significant for all MDS, correct?

A. Let's see. Where am I looking at? All MDS -- yes -- yes.

Q. Okay. Doctor, would you agree with me that this study by the folks at M.D. Anderson supports the conclusion that benzene/solvent/gasoline exposure, at high exposure, they go through in there and they don't really detail what exactly they classify as high, but it recognizes a statistically significant risk between this form of bone marrow disease and gasoline/solvent/benzene exposure, correct?

A. Well, I think -- let me just read again the conclusion. I thought -- well, let me just look at this case just a little further.

This particular study was at a time when chronic myelomonocytic leukemia was included in the MDS category, and I believe that this study demonstrated that CMML and RARS were not associated with benzene or solvent exposure. And if you looked at the table, it says what you said, but I believe that those two diseases did not have that association.

Q. That's an interesting point you bring up. Because when you look at the table I cite, Table 3, it lumps the diseases together, right? And then there are other tables where they -- they split it out a little more, correct?

A. Yeah, that's correct.

Q. Would you agree with me that where the diseases are lumped together, there's a little more statistical power in that analysis?

MR. PERRY: Object to form.

A. Well, it may be more statistical power; but you're lumping -- you might be lumping apples with oranges. So, you -- you gain by numbers, but you may lose by content.

Q. (BY MR. PATTON) But when you split too much -- and you're a splitter, right?

A. Well, I'm -- I'm -- let's say, I'd like to put the right disease in the right -- the right peg in the

right hole.

Q. But when you split too much, you might miss something, correct?

MR. PERRY: Object to form.

A. Well, if you have like diseases. But as I say, the CMML is a myeloproliferative disease and -- and no longer is in the MDS category, and that's one of the problems you encounter when you constantly change classifications, instead of simply looking at diseases as specific entities.

Q. (BY MR. PATTON) But when you look too specifically, you might lose the forest through the trees, so to speak?

MR. PERRY: Object to form.

A. Well, I think you might have a more accurate study when you look specifically at the particular disease.

(Exhibit No. 20 marked)

Q. (BY MR. PATTON) Sir, I'm going to show you what I've marked as Exhibit 20; and this is a document from the API. Do you know what the API is?

A. American Petroleum Institute or something like that. Yes, American Petroleum Institute.

Q. Okay. And I'm going to mark as Exhibit 21, something I found on the Internet that talks about what

the API is and what it does.

First of all, are you a member of the API?

A. No.

Q. Have you -- I hand you Exhibit 21 there.

(Exhibit No. 21 marked)

Q. (BY MR. PATTON) Have you relied on studies funded by the API in reaching some of your opinions in this case?

A. I have no idea.

Q. Okay. If you look at Exhibit 21, sir -- I gave you the wrong copy.

A. I'm sorry.

Q. If you look at Exhibit 21 -- if you look at Exhibit 21, sir, it talks about what the API does as far as studying chemicals, things of that nature. Do you see that? If you look four bullet points down.

MR. PERRY: You're looking at 20 right now.

Q. (BY MR. PATTON) Yeah, you're looking at 20 right now, sir.

MR. PERRY: He's talking about 21. Dr. Natelson, the other one.

A. Oh, this.

MR. PERRY: That one. That's what he's talking about, 21.

A. I'm sorry.

Q. (BY MR. PATTON) Go down to the fourth bullet point.

A. Yes.

Q. It talks about "To advise promptly appropriate officials, employees, customers and the public of information on significant industry-related safety, health and environmental hazards, and to recommend protective measures."

Do you see that?

A. Yes.

Q. And then if you go down a few more, you see "To extend knowledge by conducting or supporting research on the safety, health and environmental effectiveness of our raw material, products, processes and waste materials."

Do you see that?

A. I see that.

Q. Okay. What I've showed you marked as Exhibit 20 is an API Toxicological Review of benzene dated 1948. Have you ever seen this document before?

A. If I have, I don't recall.

Q. Okay. I want to go through -- first of all, this is the API. Again, it's kind of a research conglomerate of industry organizations, so to speak; but

this is a document they put out some 60 years ago about the dangers of benzene.

If you turn to the second page, "Probable Sources of Contact," do you see where I've marked "By far the greatest" amount of benzene -- "amounts of benzene are blended into motor gasolines," do you see that?

A. Yes.

Q. Okay. Turn to the next page, and do you see where it says "Chronic Effects"?

A. Yes.

Q. Can you read that for us?

A. "Chronic benzene poisoning results from repeated or continuous exposure to relatively low concentrations of benzene vapor."

Q. Do you agree or disagree with that statement?

A. Well, it certainly can be true. I can't disagree with that.

Q. And can you read on, "The level"?

A. "The level and degree of exposure necessary to produce poisoning apparently vary widely."

Q. Do you agree or disagree with that?

A. No, I disagree with that. I think -- this is a 1948 article. I would hope that in the last 50 or 60 years we've learned a little more than -- than what

they have here.

Q. Is it your testimony, sir, that we've learned that chronic benzene -- the chronic effects of exposure to benzene over time just really aren't that significant? Is that your position?

A. No, my -- my position is that they are significant, but it's the cumulative-dose level that one has. So, low levels over a long enough period of time, yes, can be toxic; but what we're really looking at is the cumulative dose and -- and that it takes a considerable dose of benzene to produce these illnesses.

Q. Let's go over to the next column on Page -- I think it's Page 3. Do you see where I marked "Practically all"?

A. Yes.

Q. Can you read that for us?

A. "Practically all of the chronic effects of exposure are a result of the influence of benzene or its oxidation products on the blood-forming system. A variety of reactions may be encountered, and there is little correlation between the degree and duration of exposure and the severity or nature of the findings in the blood on microscopic examination. There is no single change in the blood or blood-forming organs which is universally present in benzene poisoning."

Q. Do you agree or disagree with that statement?
A. I would -- I would disagree with that statement.
Q. This seems to imply that there is no single change in the blood or the bone marrow which is universally present in benzene poisoning, rather a variety of reactions or responses by someone's body may occur. You don't agree with that?
A. No. I think there is evidence, as I cited in my letter, what the bone marrow looks like in chronic benzene poisoning.
Q. Let's turn to the next page. You see where I've marked in the right-hand column "Chronic benzene poisoning is extremely refractory to treatment." What does "refractory" mean?
A. "Refractory" means it doesn't respond well.
Q. How did Raul Zendejas respond to treatment?
A. Well, he didn't respond well.
Q. Okay. Go on down where it says "Examinations." This talks about a preemployment examination of benzene workers, which should include a detailed history, physical, chest X-ray and a complete blood count. Do you think that's helpful from a safety and health standpoint?
A. Well, as a hematologist, I think it's good for

people to get complete blood counts.

Q. I agree.

And it says anyone with history of previous benzene intoxication or any evidence of abnormality of the blood or blood-clotting mechanism, they should be eliminated from such employment.

Do you see that?

A. Yes.

Q. Okay. Do you agree with that?

A. Well, I think if somebody has a -- has certain kinds of anemias or bone marrow hypoplasia, they shouldn't be around potentially myelosuppressive drugs.

Q. Okay. Next page. You see where I've marked, individuals exposed to concentrations approaching the safe limits should be examined at monthly intervals at least?

Do you see that?

A. Which page are you --

MR. PERRY: Which page is this?

Q. (BY MR. PATTON) Second from the last.

MR. PERRY: The last being the references?

A. Yeah, "Periodic" -- I see. Periodic re-examinations should be carried out regularly, their frequency being determined by the severity of the exposure. Individuals exposed to concentrations

approaching the accepted "safe" levels should be examined at monthly intervals at least. The examination should include a brief interval history and physical examination, together with a complete blood study, including white and differential counts and estimate of the platelet levels. The ratio of inorganic to total urinary sulfates should be determined in order to detect the presence of excessive absorption and excretion of benzene.

Q. (BY MR. PATTON) And it says at the end there, "It would be well to continue periodic blood counts for several months after exposure has ceased."

Do you see that?

A. Yes.

Q. Doctor, you recognize the blood and urine tests are or can be an important part for companies to evaluate the -- the status of benzene exposure to its workers?

A. Yes.

Q. That's an API document, right?

A. Yes.

Q. Are you aware that the API opposed increased safety standards for benzene-exposed workers?

MR. PERRY: Object to form.

A. No.

Q. (BY MR. PATTON) Are you aware that the API -- that OSHA implemented a lower threshold standard, meaning increased safety, and the API challenged that increased standard all the way to the Supreme Court? Are you aware of that?

MR. PERRY: Object to form.

A. No.

Q. (BY MR. PATTON) Exhibit 2 is your CV. Is this a complete and accurate current copy of your CV?

A. Yes.

Q. I marked as Exhibit 3, your deposition notice. In this deposition notice, it basically asks you to bring anything and everything having to do with this case or supporting your opinions. Have you done that today?

A. Yes.

Q. We're going to mark all the studies near the end, but I just want to make sure.

Are there any other studies in the universe of scientific literature which you may rely on in forming your opinions that you did not bring with you today?

A. No.

Q. Okay. Exhibit 4, this is a list of your charges; is that right?

A. Yes.
Q. You worked 12-and-a-half hours at first and then another 7 hours before -- yesterday; is that right?
A. Yes.
Q. And you charge how much per hour to testify?
A. $250 an hour to review and phone calls, et cetera. $400 an hour to testify.
Q. Okay. Exhibit 7, I don't have a copy of, but if you want, I can get a copy, if it will make it easier to go through -- I think we're going to need a copy.
MR. PATTON: Let's go off the record.
THE VIDEOGRAPHER: Now going off the video record. The approximate time is 3:04.
(Recess taken from 3:04 to 3:19.)
THE VIDEOGRAPHER: Now back on the video record. Approximate time is 3:17.
Q. (BY MR. PATTON) Dr. Natelson, we took a break and I've marked as Exhibit 7 -- actually, before we started your deposition. Exhibit 7 is a list of testimony you've given in cases either by trial or deposition; is that right?
A. Yes.
Q. This dates back to 2004, correct?
A. Yes.
Q. What year did you first start testifying in

benzene exposure cases?

A. Probably -- I don't know exactly, but it would be probably in the early to mid-1990s.

Q. I counted -- we counted through these together, the cases on this list since 2004 that you've testified in which involved benzene; and it's a little over 30; is that right?

A. If -- I wasn't counting while you were -- but that -- that's probably so.

Q. Okay. Sir, have you ever testified on behalf of a plaintiff in a benzene exposure case?

A. No.

Q. Have you always testified on behalf of industry?

A. Of the defense, yes.

Q. Was it your testimony in each of these cases that benzene was not a substantial factor in the person's disease?

A. Yes.

Q. Was it your testimony in each of these diseases that benzene was not -- that there was not a 51 percent chance that benzene caused the disease?

MR. PERRY: Object to form.

A. I don't know that I used that number, but I -- I testified that I -- that more likely than not benzene

was not the causative factor.

Q. (BY MR. PATTON) Did you testify in any of these 30 or so cases that benzene was a causative factor in the disease?

A. No.

Q. Most of these cases arise down here in the Texas Gulf Coast, correct?

A. Most of them, yes.

Q. Sir, if someone wanted to hire you to testify for a plaintiff in a benzene exposure case, what criteria would you have to see before giving the opinion that benzene was -- was a substantial factor in the person's disease?

A. Well, first, it would have to be a disease that benzene is known to potentially cause. That could be aplastic anemia, certain forms of acute myeloid leukemia, certain forms of myelodysplasia. So, it would have to be the right disease.

Then it would be -- have to be a person who had a substantial benzene exposure.

Then it would have to be a person in whom there were no complicating factors, potential other causes, such as -- other potential causes other than benzene, for example, smoking or chemotherapy, other potential causes.

Q. Would you agree with me that someone's given form of myeloid leukemia may have more than one substantial cause?

A. I don't know that to be so. I think we like to look for -- in medicine we operate under Ockham's law, that there is one cause for the illness. There may be multiple manifestations, but we like to look for a single causative factor.

Q. When you said the exposure to benzene would have to be substantial, what do you mean by that?

A. Above 40-part-per-million years, cumulative dose.

Q. And who would you expect to give you that assessment of cumulative dose?

MR. PERRY: Object to form.

A. It could be someone who is involved in those types of measurements.

Q. (BY MR. PATTON) You would need to see some type of report from another expert?

A. Yes, I couldn't determine that myself, in other words.

Q. But as a practitioner, have you determined that benzene was a substantial cause of someone's disease without looking at a cumulative report by an expert?

A. Yes, in certain circumstances, yes.

Q. But to testify, you would want a cumulative report?

A. I think I would like to see a cumulative report. And I -- also, I would like to see other factors commonly not mentioned. We know that chemical-induced leukemia, 90 percent of the time, has easily demonstrable chromosome aberrations. So, I'd like to see if they were present and what type of aberrations they were because certain aberrations have never been described with benzene poisoning or benzene-induced leukemia.

I also would like to know -- I think I commented about competitive factors or other risk factors.

(Exhibit No. 22 marked)

Q. (BY MR. PATTON) I am going to mark as Exhibit 22, a document from the API. Have you ever seen this document before?

A. No, I don't think so.

Q. Sir, I'll represent to you that this is a document that was produced in this case; and it is meeting minutes from 1991 from the API when they were talking about research to conduct in conjunction with their international symposium on the health effects of gasoline. They're studying -- or they're examining what

kind of studies and research they may want to do with respect to benzene and gasoline.

Do you understand that?

A. Yes.

Q. Have you ever been invited to such a meeting on behalf of the API?

A. No.

Q. Have you ever been invited to such a meeting on behalf of Shell?

A. No.

Q. Have you ever been to the Doral Resort and Country Club in Miami, Florida?

A. No.

Q. Okay. That's where they had this meeting. And just so we're clear, sir, you've never been a part of any such API activities?

A. No.

Q. If asked to be involved, would you do so?

A. Probably not.

Q. The next exhibit I am going to mark -- is it because you don't golf or you just don't have the time?

A. Well, I only golf once every ten years and it's not the right time for me. And I hate to travel. I hate to fly. And, so, I -- I would probably not go to a meeting like that.

Q. So, you wouldn't be interested in going to the Doral Resort and Country Club in Miami, Florida --

A. No.

Q. -- to talk about benzene and gasoline research?

A. No.

Q. I am going to mark as Exhibit 23, a -- some sections from a textbook titled Myelodysplastic Syndromes, and Dr. Gore, plaintiffs' expert in this case, he was an author of some of the sections of this textbook.

(Exhibit No. 23 marked)

Q. (BY MR. PATTON) Have you ever seen this textbook before?

A. No.

Q. If you turn to the second page there, Page 17, it talks about "Probable Causative Factors for MDS"; and it's got a little Table 3.1.

A. Yes.

Q. And it talks about "Potential causative agents in the etiology of MDS," again, a bone marrow disease.

A. Uh-huh.

Q. And it talks about definite causes, chemo drugs. And you testified earlier that it's easy to call chemo drugs a possible cause of someone's leukemia because you can so quickly observe the dose they were

given and then the response?

A. You can accurately receive the dose, and the follow-up is very good on chemotherapy patients. So, you know the latency period very accurately.

Q. Now, for probable causes, which include benzene, it's a little -- it's a little tougher to call the definite cause because you have to make certain estimations, right?

A. Yes.

Q. Do you think it would be possible to cause -- to call benzene the definite cause of someone's disease?

A. Well, I don't think so because I couldn't do that with anything. We don't have -- there's no marker on any case of AML that says this was caused by this, and that was caused by that. We can only say in all probability whether it was or wasn't.

Q. The next exhibit, Doctor, I will mark as Exhibit 24.

(Exhibit No. 24 marked)

MR. PATTON: I'm almost done.

Q. (BY MR. PATTON) This is Exhibit 24. This is a study from -- this is a study regarding the Tranguch Gasoline Spill in Pennsylvania.

Have you ever seen this study before?

A. No.

MR. PERRY: Is that the lead author, Patel?

MR. PATTON: Yes.

Q. (BY MR. PATTON) Have you read the Abstract on the front there? And I'll give you a couple minutes to look through this.

A. I see the Abstract.

Q. Do you see where it indicates a statistically significant four-fold risk for leukemia from those who lived near this gasoline spill?

A. Yes.

Q. Do you understand this study deals with gasoline being spilled from underground leaky storage tanks?

A. Yes.

Q. Okay. Do you understand my client, Raul Zendejas, stood on top of a loading rack with a large hose that unloaded gasoline into tanker trucks and into other -- other vessels, so to speak?

MR. PERRY: Object to form.

A. Yes.

Q. (BY MR. PATTON) Would you agree with me that someone who was top loading gasoline without any vapor recovery measures is going to be exposed to more benzene than someone who lives in an area where there is benzene

underground?

MR. PERRY: Object to form.

Q. (BY MR. PATTON) Or do you -- or do you have no opinion?

A. I have no opinion on that.

Q. Would you agree with me that this study supports the conclusion that benzene via gasoline exposure has in some populations showed an increased risk of leukemia?

MR. PERRY: Object to form. Misstates the --

A. Well, I would have to comment, that there are a very tiny number of cases; and it is -- it is statistically significant. I see what it says, and I would say it's a very small study.

Q. (BY MR. PATTON) You have criticisms of this study because of its size?

A. Yes. When you only have four cases, you have one case expected and you see four, there are clusters of leukemia that occur without known cause. We had one, I can recall, from a small town in Texas when I was a house officer and everybody went down there at -- there was no reason for it and it didn't reoccur. And we had about five or six cases that all came to Methodist Hospital; and then just as quickly as they started, they

disappeared. It was just a cluster, and there was no -- no chemical, no sickness, no nothing anybody could put their fingers on. And these things happen. When you only have four cases, that's not enough to be certain about anything, I don't think.

Q. Speaking of epidemiology in general, are you an epidemiologist?

A. No.

Q. As a health professional, would you agree with me that all the studies you brought with you today, as well as the studies that plaintiffs' experts rely on, all of those are subject to evaluation; they're all subject to praise and subject to criticism. Fair statement?

A. Yes.

Q. We could go through any of these studies, pull out some strengths, some weaknesses, come up with some arguments on both sides of these studies, correct?

A. Yes.

Q. But at the end of the day, you do agree with me that benzene is shown consistently throughout the epidemiological literature to support a -- that benzene -- the conclusion that benzene causes leukemia?

MR. PERRY: Object to form.

A. Benzene may cause acute myeloid leukemia.

Q. (BY MR. PATTON) Benzene may cause certain forms of MDS on your chart there, Exhibit 8, right?
A. Yes.
Q. You do not believe benzene causes atypical CML?
A. No.
Q. Have you reviewed Dr. Infante's opinions in this case?
MR. PERRY: He hadn't gotten the deposition yet, and Infante didn't prepare a report.
Q. (BY MR. PATTON) Have you reviewed Dr. Gore's deposition?
A. Yes.
Q. I think I asked you this earlier, and I'm not going to ask you again.
To finish up here, Exhibit 6 to your deposition seems to be some State Fund, Arizona, workers' compensation records. What is the significance, if any, of those?
A. Nothing to me. This was just material I was sent.
Q. Okay. Doctor, what I want to do is go through all the exhibits real quick.
No. 1 is your report, correct?
A. Yes.
Q. Two is your CV?

A. Yes.
Q. Three is your deposition notice?
A. Yes.
Q. Four are the billing records?
A. Yes.
Q. No. 5 is certain medical records. You, in fact, have on disk additional medical records, right?
A. Correct.
Q. Is there any significance in some of the records that you've printed, which are in Exhibit 5, that bear on your opinion or your interpretation of Raul's diagnosis?
A. Well, the statement by this physician -- I'm not sure how you pronounce the name -- Fayssoux, who indicates the diagnosis was myeloproliferative disorder and that he had a chronic myeloproliferative disorder.

I thought the bone marrow report was kind of interesting. It's -- it's a minor point, but the -- when we look at myelodysplasia, one of the things we look for are what are called Pelger-Huet cells. And normally a neutrophil, or a granulocyte, has multiple lobes in it; and that's what we mean when we call it a poly. It's got multiple nuclear lobes.

A Pelger-Huet cell is a mature granulocyte, but it's like a bow tie. It only has two

lobes. And what happens to these cells is normally granulocytes mature in the marrow and they come out and circulate. And many years ago it was shown that if you acquired Pelger-Huet cells, that is to say, you found somebody who didn't used to have them and now they had them in the peripheral blood, it was a sign of underlying myelodysplasia, myelodysplastic syndrome, sick bone marrow, acute leukemia. It was not a good thing to have Pelger-Huet cells in the peripheral blood. But it's a peripheral blood phenomenon. In other words, a Pelger-Huet cell, by definition, to be a Pelger-Huet cell, must be seen in the peripheral blood. And what this report says, it says there is a pseudo Pelger-Huet anomaly, mostly in the bone marrow, not on the peripheral blood smear.

Well, if it's not in the peripheral blood smear, it's not a Pelger-Huet anomaly. In other words, that's a peripheral blood phenomenon.

And, so, some people think they can look at a bone marrow and look at the immature cells and tell whether they're going to -- going to grow up to be a Pelger-Huet cell, but the bottom line is, by convention, that's a peripheral blood finding.

So, I think this report is not accurate from that standpoint. It's a minor point --

Q. Are those --

A. -- and doesn't change the diagnosis.

Q. Are those abnormal cells generated in the bone marrow?

A. They're generated in the bone marrow, but the bottom line is, you see, in order to know that they wouldn't fully develop, they've got to be able to mature and come out and circulate. And when they come out and circulate and they're still not mature, you can know there was some inhibition of the maturation process. While they're still in the bone marrow, they've still got time to mature.

So, it's hard to be really accurate by calling Pelger-Huet cells in the bone marrow; and that's why, by convention and by all descriptions and by every comment in textbooks, it's a peripheral blood phenomenon. And, so, I thought the report was interesting when he says I didn't see them in the peripheral blood. I saw them in the bone marrow. That's his tilt. In other words, that's -- they're not a bone marrow phenomenon.

Q. Is it a bone -- is it a -- a cell abnormality, though?

A. It is a cell abnormality, that's right.

Q. Raul did have that cell abnormality?

A. Well, the pathologist said he had it in the bone marrow. As I say, you could use the term -- I think there is maturation abnormalities in the bone marrow. I think when you use the Pelger-Huet term, you're talking about an observation in the peripheral blood; and he didn't have that observation in the peripheral blood, as the doctor indicates. I just thought it was cute. It doesn't have any influence on the case whatsoever, but I thought it was interesting. That's why I highlighted it.

Q. Exhibit 6, the State Fund records.

Exhibit 7 is your testimony list?

A. Yes.

Q. Can you write "Dr. Natelson" at the bottom of Exhibit 8 there with -- you have a pen next to you?

MR. PERRY: There's the red marker right there, the one you used.

A. Oh, this. Oh, this.

MR. PERRY: That's Exhibit 8.

A. What would you like me to write?

Q. (BY MR. PATTON) Just write your name on it somewhere.

A. (Witness complies.)

Q. Okay. I'll take that.

A. Oh, okay.

Q. Exhibit 9 through 19 are all studies.

Exhibit 20 and 21 are API references.

Can I see those?

A. These.

Q. Twenty-two is the meeting at the Doral Resort and Country Club in Miami, Florida where you weren't invited. I meant that as humor.

Twenty-three is the MDS textbook.

Twenty-four is the Tranguch study.

And 25 is the Cortes and Kantarjian, M.D. Anderson article, "Beyond Chronic Myelogenous Leukemia," correct?

A. Yes.

Q. That's Exhibit 25.

(Exhibit No. 25 marked)

Q. (BY MR. PATTON) And 26 -- Exhibit 26 -- I will mark -- is the Adegoke study. I think we talked about this a little earlier.

A. We did.

Q. And then as a group exhibit -- I will mark the remainder of your studies as Exhibit 27.

(Exhibit No. 26 and 27 marked)

Q. (BY MR. PATTON) And this includes a Vardiman article; Schnatter, Lewis; Williams and Paustenbach; your article, Dr. Natelson, on benzene-induced AML; the

U.K. study by Sorahan; Satin, S-A-T-I-N, "A 50-Year Mortality Follow-up of a Large Cohort of Oil Refinery Workers in Texas; Catenacci, C-A-T-E-N-A-C-C-I, "Myelodysplactic syndromes: A comprehensive review"; a letter to the editor from Blood, 2006, about JAK2 mutation; therapy induced -- or therapy-related leukemia by Rund; Pedersen-Bjergaard, "Myelodysplactic Syndromes"; an article in The Oncologist by Dr. Lichtman; CML, "Chronic Myeloid Leukemia," by Druker; Lynge, L-Y-N-G-E, "Risk of Cancer and Exposure to Gasoline Vapors"; RARS article; Linet article.

MR. PERRY: L-I-N-E-T.

Q. (BY MR. PATTON) Vardiman article; Silver; Beran, Dr. Beran, "Prognostic significance of monocytosis in patients with MDS"; Orazi; Ruiz; Tefferi; Morgan; Eastmond; Whysner; Smith; Gulf War and Health; Cole; Schechter, Hematology 1999; Pazdur, Cancer textbook; Pamela Williams and Dennis Paustenbach; Aksoy; Wong; Satin; Wong; Sorahan; Divine; Gun; Bloemen; Wong; ATSDR, 1995, "Toxicological Profile For Gasoline."

Sir, is it going to be your testimony in this case that because gasoline is not classified as a carcinogen, that the benzene in gasoline cannot cause myeloid damage?

MR. PERRY: Object to form.

Q. (BY MR. PATTON) I think I asked that before.
A. No, it's just -- it's just an observation.
Q. Okay. Zhang article; Olney article; the Monash Health Watch 2007 update; ATSDR, "Toxicological Profile for Benzene, August 2007"; Jamall; and Swerdlow.
Let's take a short break.
Actually, I have one more. The Irons article.
I think this is my last question. Did Raul Zendejas have any hypocellular bone marrow and dyserythropoietic changes?
A. Well, his bone -- hypocellular means few cells. He had a hypercellular bone marrow, meaning lots of cells. So, he had the opposite.
Q. And what's that dyser --
A. Dyserythropoiesis just means morphologic dysplastic changes. The cells look funny.
MR. PATTON: Okay. Let's go off the record real quick.
THE VIDEOGRAPHER: Now going off the video record. Approximate time is 3:41.
(Recess taken from 3:41 to 3:48.)
MR. PATTON: I have no further questions.
Doctor, thank you for your time; and we'll attach all the exhibits to the deposition.

(Proceedings concluded at 3:48 p.m.)

CHANGES AND SIGNATURE

WITNESS NAME: Ethan Natelson, M.D.

DATE OF DEPOSITION: September 25, 2009

PAGE LINE CHANGE REASON

I, ETHAN NATELSON, M.D., have read the foregoing deposition and hereby affix my signature that same is true and correct, except as noted above.

_____

ETHAN NATELSON, M.D.

THE STATE OF _____)
COUNTY OF _____)

Before me, _____, on this day personally appeared ETHAN NATELSON, M.D., known to me or proved to me on the oath of _____ or through _____ (description of identity card or other document) to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he/she executed the same for the purpose and consideration therein expressed.

Given under my hand and seal of office on this _____ day of _____, _____.

_____

NOTARY PUBLIC IN AND FOR
THE STATE OF _____

My Commission Expires: _____

IN THE SUPERIOR COURT OF THE STATE OF ARIZONA
IN AND FOR THE COUNTY OF MARICOPA

RAUL ZENDEJAS and ARACELI ZENDEJAS, Plaintiffs

vs.

NO. CV-2007-005399

SHELL OIL COMPANY, SHELL CHEMICAL LP, Individually and as Successor-in-interest to SHELL CHEMICAL CORPORATION; CONOCOPHILLIPS COMPANY, VON VERDE CITRUS PACKING HOUSE, INC., an Arizona corporation; VON VERDE HARVESTING, INC., a dissolved Arizona corporation; and VON VERDE CITRUS GROWERS COOPERATIVE, INC., a dissolved Arizona Corporation, Defendants.

REPORTER'S CERTIFICATE
ORAL VIDEOTAPED DEPOSITION OF ETHAN NATELSON, M.D.
September 25, 2009

I, Kelly Hanna, Certified Shorthand Reporter in and for the State of Texas, hereby certify to the following:

That the witness, ETHAN NATELSON, M.D., was duly sworn and that the transcript of the deposition is a true record of the testimony given by the witness;

That the deposition transcript was duly submitted on _____ to the witness or to the attorney for

the witness for examination, signature, and return to me by _____.

That pursuant to information given to the deposition officer at the time said testimony was taken, the following includes all parties of record and the amount of time used by each party at the time of the deposition:

Mr. Keith E. Patton (3h52m)
Attorney for Plaintiffs

Mr. Stan Perry (0h0m)
Attorney for Defendants

That a copy of this certificate was served on all parties shown herein on _____ and filed with the Clerk.

I further certify that I am neither counsel for, related to, nor employed by any of the parties in the action in which this proceeding was taken, and further that I am not financially or otherwise interested in the outcome of this action.

Further certification requirements pursuant to Rule 203 of the Texas Code of Civil Procedure will be complied with after they have occurred.

Certified to by me on this _____ day of _____, _____.

_____

Kelly Hanna, CSR, RPR, CRR, CMRS
Texas CSR 1654
Expiration: 12/31/2009
Firm No.: 69
2501 Oak Lawn
Suite 600
Dallas, Texas 75219
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FURTHER CERTIFICATION UNDER TRCP RULE 203

The original deposition was/was not returned to the deposition officer on _____.

If returned, the attached Changes and Signature page(s) contain(s) any changes and the reasons therefor.

If returned, the original deposition was delivered to Mr. Keith E. Patton, Custodial Attorney.

$_____ is the deposition officer's charges to the Plaintiffs for preparing the original deposition and any copies of exhibits;

The deposition was delivered in accordance with Rule 203.3, and a copy of this certificate, served on all parties shown herein, was filed with the Clerk.

Certified to by me on this _____ day of _____, _____.

_____

Kelly Hanna, CSR, RPR, CRR, CMRS
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