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Introduction: Dr. Margaret Kripke is professor of immunology and Vivian Smith Chair Emerita at the University of Texas MD Anderson Cancer Center. Dr. Kripke is also one of two panelists, along with Dr. LaSalle Leffall of Howard University College of Medicine, on the President's Cancer Panel, which recently produced a new report, *Reducing Environmental Cancer Risks: What We Can Do Now*. Dr. Kripke spoke recently with Jeanne Rizzo, President and CEO of the Breast Cancer Fund; Susan Braun, Executive Director of Commonweal; and Michael Lerner, President of Commonweal.

Michael Lerner: Margaret Kripke, welcome. I'm so glad to have you here.

Margaret Kripke: Thank you.

Michael Lerner: I'm sitting here with Jeanne Rizzo, President and CEO of the Breast Cancer Fund, and Susan Braun, Executive Director of Commonweal. And Margaret, you are Vivian L. Smith Chair and Professor Emerita at the University of Texas MD Anderson Cancer Center, and you were one of two panelists with LaSalle Leffall on the 2008-2009 report of the President's Cancer Panel called *Reducing Environmental Cancer Risks: What We Can Do Now*. Jeanne Rizzo, Susan Braun, and I and you have all been involved in cancer work for a long time, and for those of us having this conversation with you, your report was one of the most important public documents about cancer and the environment ever produced in the United States. We're very eager to explore with you how you came to do it, what you concluded, and what your reflections are. So, let's just start with how you came to be on the President's Cancer Panel.

Margaret Kripke: The President's Cancer Panel is a group of three people who are appointed by the United States President, and their responsibility is to survey the landscape in cancer research and cancer treatment, and try to point out to the White House what gaps there are, what things could be done to accelerate the agenda of reducing cancer. I was appointed in 2003 by George W. Bush, and I've served on the panel since then. I suppose I was nominated by various people to serve in the role of basic scientist on the panel. Typically the panel has an advocate—a cancer advocate—a scientist, and a clinical person.

Michael Lerner: And how did the President's Cancer Panel decide to focus on cancer and the environment?

Margaret Kripke: It's an interesting process. We focus on a different topic every year. So each year both the panel members and the staff suggest topics, and we discuss them, and the staff works up a little white paper about what would be involved. Then we have a lot of discussions about are we happy with this, what would we like, what things would be appropriate and current for the panel to look at. And I have to tell you that this series was extremely controversial. There were a lot of both pros and cons about doing a series of this kind. And I have to freely admit that I was not very enthusiastic about doing it, at the outset. Part of the reason for that is that environmental carcinogenesis is a topic where there's a lot of controversy, there's a lot of uncertainty. So you have to think what is going to be the public message that comes out of that and what conclusions could we draw when there are so many things where there's just not enough information. That was one issue. The second issue was that this is a very emotional issue for a lot of people. Many people are concerned about why

they got their cancer, and they are convinced that their cancer was caused by something in the environment. I was concerned that we would be diverted from an objective analysis to an emotional issue. The third issue was that there is a stated figure about how many cancers are caused by environmental agents, and that figure is 6%. And it wasn't clear to me that the President's Cancer Panel should be focusing on an issue that only affected perhaps 6% of cancers. So I was not wildly enthusiastic about this as a topic at the outset.

Michael Lerner: So, I'm very interested in what happened to your perspective in the course of the hearings you held around the country on different aspects of this, all the scientists you brought together to listen to. What happened to your perspective over the course of that?

Margaret Kripke: One of the reasons I agreed that we should do this is that other people pointed out that 6% is still 20,000 deaths per year—40,000 people with cancer and 20,000 deaths per year. Those people deserve a voice too. So that was one persuasive argument. A second persuasive argument is that this is a subject of huge public interest at the moment. And the third persuasive argument is that cancer research has not focused on this area. I've been a cancer researcher for my entire professional career. I go to all the cancer meetings. And hardly ever do you hear anything about environmental carcinogenesis. It's just not part of the mainstream of cancer research. So I was convinced, yes, we should go ahead. We didn't seem to have any other compelling issues on our agenda, and we should go ahead and do this. Well, this was an enormously eye-opening experience for me. After one meeting—the first meeting we did, which was on cancer in the workplace—I became a crusader looking at this issue, because it was so different from anything that I had expected.

Michael Lerner: And how so?

Margaret Kripke: I always assumed that if you have something in the workplace that's regulated, that the regulations would be in force. And this turns out not to be true in all cases. So we have regulations—carcinogens in the workplace that are regulated—and the regulations may be very unevenly enforced. I always assumed that if something was a known human carcinogen, that it would be regulated. This is clearly not the case. Also, there are carcinogens in our environment that have been banned in Europe, banned in Canada, that we are still using and that still remain unregulated to this day. Secondly, I always assumed that before things were put on the market, that they would be tested. And that, too, is absolutely not the case. We test very few things for cancer-causing properties. The United States has not regulated much of anything since the 1990's, and so we have really not had much activity in that arena. And the third point is that it's estimated that there are somewhere around 80,000 man-made chemicals that are currently in our environment, most of which have been put there since the end of World War II. And only around 2% or less of those have actually been tested for cancer-causing properties. Now, some of them obviously are not candidates for cancer-causing properties, but others are, and we seem to espouse the reactionary principle which is that until something is demonstrated to be harmful, we don't worry about it; whereas in other places in the world people say, if we think it's going to be a problem and there's uncertainty, we should take a precautionary approach to putting things into the environment.

Michael Lerner: So, you went from being a skeptic about doing this, to, in your words, a crusader. That must have been an extraordinary personal transition for someone who has been one of the leading cancer researchers in the country.

Margaret Kripke: It was an eye-opening experience for me. Listening to the testimony of government regulators, government funding agencies, scientists from all walks of life, and hearing their stories about what is going on in this arena was really very powerful. And, you know, I like to think of myself as a scientist, as being very open-minded and being very willing to listen to various points of view. And I must say, I was really overwhelmed by this issue.

Michael Lerner: Overwhelmed in the sense that there was more good science than you expected?

Margaret Kripke: No. Overwhelmed in the sense that I was so naive in terms of my belief that we were being protected from things in our environment.

Michael Lerner: And did you find in the course of the hearings that there was more science than you expected on this, or not?

Margaret Kripke: This is not an area where I have personal expertise, so I learned a lot of things about science that was going on. But I think the overwhelming sense is that there needs to be much more science. And when we started looking at things like agricultural exposures to pesticides and fertilizers and so on, it was very clear that we have very little information about the public health impacts of those things. So I was left with a sense that we have very little knowledge about what really is going on in our environment and we need much more information.

Michael Lerner: Jeanne Rizzo, you have thought about breast cancer and the environment for a long time as President of the Breast Cancer Fund. You were actively involved with the process of the President's Cancer Panel. When it came out, what was your response to it?

Jeanne Rizzo: When the report came out, it was as if everything you had been working for, and everything those before us, whose shoulders we stand on, had been working for had, on the one hand, been validated. It was validating. And on the other hand, it was in a form that would communicate so much more than we all could ever hope to accomplish. We worked many years, looking upstream for the causes of cancer—of breast cancer—and worked to move the mainstream. And now, there was the mainstream standing square in it with this report. And I thought, this report will be a legacy piece. People will refer back to it five, ten, twenty years from now and say: that's when the mainstream understanding about cancer causation changed. And that's what I expect from this report.

Michael Lerner: Susan Braun, you've again spent much of your professional life in the cancer field. When you first saw and read the report, what was your response?

Susan Braun: It's interesting for me to hear Margaret talk about this because I, too, spent a good bit of my career looking at biomedical research in cancer, looking at public policy around screening and treatment, both very important. I've learned in the last five years or so quite a bit more about what we do and don't know about cancer in the environment, and I have had the response the more I've learned -- that there is a great deal there that simply doesn't seem to be in the line of vision for part of the group of people working in cancer. It certainly wasn't in my line of vision.

Seeing this report, as Jeannie said, is validating. It also has a very concise and readable way of

explaining where those gaps are and pointing out to us what to look at, what we do and don't know. There are also some action steps that people can take so that it doesn't become an area where people feel hopelessness about what can be done. Another thing Margaret mentioned is that there had been estimates about the number of cancers or the percentage of cancers that might be related to cancer in the environment. And the report very clearly shows that those estimates have been flawed—they aren't well grounded in fact—and that we really don't know much about what the public impact is. And so I think the way the report elucidates that and opens up the space to say that this might be bigger than we know—it might be extraordinarily important for public health, and I know many of us believe that it is—gives us an opportunity to explore that more deeply. I think it has a phenomenal impact, and more potential for impact moving forward. I think this is something that will live on for a long time.

Michael Lerner: Yes, we tried to get an estimate of the number of hits on this report. Jeanne I think you got the estimate in our group. There have been a huge number of hits on the Internet on this report. It has attracted attention all around the world. And I suppose I want to ask you—as you moved from being a skeptic to a crusader just based on what you were learning—did you have any sense of how this report would be received when it came out? And were you surprised by the response?

Margaret Kripke: I had no sense of how this would be received and I was absolutely surprised by the response. First of all, the President's Cancer Panel reports are typically used by policy groups and some research groups to help make their case for their own agendas, and so on. Sometimes they're used in policy-making decisions, but typically they don't create a huge response. This one has been overwhelming. And, again in my naïveté, I had not anticipated that this would be the case. So, this has been both a little scary and gratifying in terms of the response that we have gotten. And, of course, we've had responses on both sides of the fence.

Jeanne Rizzo: The links from our site to the report have rivaled our own *State of the Evidence*, so it's right up there with that. People come to our site and they link through and download the report. I think we've run out of printed copies but we've been ordering 100 or 200 at a time. I think we've distributed six or seven hundred copies ourselves—people want the report. People don't usually pick up a report that size for the heck of it. They really want it.

Michael Lerner: Yes, it's extraordinary. So, you said it was both surprising and somewhat scary to get this kind of response, and there were responses on both sides—absolutely so. And I would say in some ways legitimate responses on both sides—people concerned that this report might divert attention from important issues like smoking and obesity, and obviously people who thought it was important to bring some attention to this report. So you found it both gratifying but also a little overwhelming and frightening. What was the gratifying part? What was the frightening or difficult part?

Margaret Kripke: The gratifying part is that there are just so many people who are interested in the report, and that people who are interested in environmental issues have been very supportive and very responsive to the report. On the other hand there have been a lot of critics of the report, and one of the major criticisms is just what you said—that this report focuses very specifically on environmental causes of cancer and does not include lifestyle factors such as tobacco, nutrition, exercise, and so on. In defense of the panel I should say that our report two years previously had been on life style factors and their role in cancer causation. We spent

half of the report looking at tobacco and half of the report looking at nutrition and exercise, obesity, and those factors in cancer. And one of the criticisms that we received about that report is: you didn't include anything about the environment. So we thought, OK, we'll look at the environment on this one because we had just done a report on the other factors. Also, the year before this one came out, we did a report on what are the three most important things you could do to reduce the burden of cancer today. And number one, of course, is getting rid of tobacco. So we felt we had looked at that issue fairly comprehensively. And I don't think that this report detracts from other issues. I think people understand multi-causality of diseases, and so I don't think that saying there are things in your environment that might be dangerous keeps people from thinking, well tobacco is bad for you also.

Michael Lerner: Jeanne Rizzo, as you read the report, and you've thought about it carefully, were there particular areas of interest or questions that came up for you that you'd like to explore?

Jeanne Rizzo: In reading the report I was impressed by the call out of hazards related to medical health care and also to the military. Often, those two areas are not addressed...they're sacred cows in some ways, and they get woven into the rest of the issues. In particular, the fifty-plus marines or more from Camp Lejeune exposed to contamination in the water. I just wondered if you could address both the medical sources of radiation—the medical care part of it—and the military part, since I think those two really were uniquely addressed in the report.

Margaret Kripke: The medical sources of radiation issue was actually brought to us by radiologists. The radiologists have a movement at the moment to educate providers—particularly of CAT (CT) scans—because they produce very, very high levels of radiation exposure—many, many more times higher than an X-ray, for example. They showed data about the increase in the use of CT scans over the last ten years, and it's just astronomical. And it's used very often for children, who fall on the playground, hit their heads, and they're given repeated CAT scans. So they actually brought up this question of wanting to regulate the CT scanning industry. They pointed out that not every CT scanner emits the same amount of radiation, so you can have a hugely different dose of radiation, depending on where you go. And there's not a lot of control over the training of technicians who administer CT scans. They actually brought this to our attention and they are very actively engaged in trying to control—limit the number of CT scans—not get rid of them, because they're incredibly valuable as medical tools—as are X-rays—dental X-rays, mammography, and so on. But the excessive use of those things is what they are concerned about and I think that's what came out in the report.

Michael Lerner: I remember hearing the testimony on that, and it was frightening. In fact, it seemed to me that one of the areas where we could do the most good and reduce harm—where there's just a real opportunity for a shift in practice—is right there. So many of these things are vast, difficult problems, and that's one where we could really make a difference.

Margaret Kripke: Yes, and I think the American Radiology Society is in fact doing exactly that.

Michael Lerner: And what about the military toxics that Jeanne Rizzo mentioned? We just interviewed a Marine and the son of a Marine who were among the 60-some Marines from Camp Lejeune known to have male breast cancer. It's an extraordinary concentration, and we don't even begin to know the total number of male breast cancers, but it appears to be related to

water contamination at Camp Lejeune. And it's a very interesting science issue as to what the linkages are there, which are now being explored. But it raises the whole question that Jeanne is raising about military toxics and both the impact and your important and strong language about that in the report, where you said that there should be, if I remember, an aggressive effort to reduce military toxics. What about that area of interest?

Margaret Kripke: One of the issues from the military is all the designated Superfund sites in the United States, which are heavily contaminated with toxic materials that are seeping into the groundwater—that get out of what they're contained in and get into the environment. A number of those are actually from military bases.

Michael Lerner: Nearly 900 of the Superfund sites.

Margaret Kripke: Thank you. I didn't want to misquote. And so, it seemed to us that the military has not moved aggressively to do anything to clean up these sites, and they've been very reticent to investigate or to publicize the effects of these substances in the environment. It's very similar to the case that we've had over the last few years with what are called the "downwinders." These are people who live in Arizona downwind of the atomic test sites. And there's a whole group of people there who are now experiencing cancer and whatever from the tests in the 1950s, and they've had a very hard time getting any kind of remuneration or assistance from the military or from the federal government from being innocently impacted by these tests. The same is true in the Marshall Islands, for the Marshall Islanders who were recipients of really heavy doses of radiation from nuclear testing. I know that the military is one of the sacred cows, but it just seemed logical that this is a place where we could potentially make an impact if someone would say, we have a problem here.

Michael Lerner: One of the most powerful aspects of this report, really, appears on the first page, which is the letter that you and LaSalle Leffall wrote to President Obama, and I'd just like to quote a little of it so that listeners can get a sense of it. You say, "*Dear Mr. President: Though overall cancer incidence and mortality have continued to decline in recent years, the disease continues to devastate the lives of far too many Americans. In 2009 alone, approximately 1.5 million American men, women, and children were diagnosed with cancer, and 562,000 died from the disease. With the growing body of evidence linking environmental exposures to cancer, the public is becoming increasingly aware of the unacceptable burden of cancer resulting from environmental and occupational exposures that could have been prevented through appropriate national action.*" And you then go on to say, "*The panel was particularly concerned to find that the true burden of environmentally induced cancer has been grossly underestimated. With nearly 80,000 chemicals on the market in the United States, many of which are used by millions of Americans in their daily lives and are un- or understudied and largely unregulated, exposure to potential environmental carcinogens is widespread.*" And at the end you say, "*All levels of government, from federal to local, must work to protect every American from needless disease through rigorous regulation of environmental pollutants. Environmental exposures that increase the national cancer burden do not represent a new front in the ongoing war on cancer. However, the grievous harm from this group of carcinogens has not been addressed adequately by the National Cancer Program. The American people—even before they are born—are bombarded continually with myriad combinations of these dangerous exposures. The Panel urges you most strongly to use the power of your office to remove the carcinogens and other toxins from our food, water, and air that needlessly increase health care costs, cripple our Nation's productivity, and devastate*

American lives.”

These are strong words from two highly respected, distinguished cancer scientists. You must have thought long and hard before you wrote that letter.

Margaret Kripke: Well, having thought longer and harder since the letter came out, I might not have made it quite as bombastic as it is. But in point of fact, that is a letter that was designed to attract some attention to the report. And as mentioned earlier, very often the reports sit there and no one pays much attention, and we thought we really need something that will capture the attention not only of the White House, but also of the American public. As a scientist whose whole career is based on objective evidence before you make a conclusion, this is a little far out for me, even. But I believe that what we've said is true, and will be shown to be true in the future. We did take a lot of criticism in saying that the figure of 6% of cancers may be due to contaminants—that that number is grossly underestimated. And people said, well you have no evidence for that. I think we will have evidence for that. I think evidence is growing that that's the case. First of all, the study that concluded that this represented 6% of cancers was done thirty years ago. And secondly, even the authors of the study said that this is an underestimate—we've only included a few things in this calculation that this is an underestimate. So I think we will be proven correct on those grounds.

Michael Lerner: Susan Braun, as you read the report, what came to the surface for you as the key points or questions that would be most interesting to explore with Margaret?

Susan Braun: There were so many. I think it was nicely balanced in all of the point areas that are brought up. But one that's particularly interesting is the disproportionate effect on children, and on underserved populations. For a number of children's cancers, for example, although mortality is down, incidence is up. We realize this is not likely to be related to lifestyle, when we're dealing with young children. And then different but strongly weighted in the same way is the disproportionate effect that the environment can have on certain populations—you mentioned downwinders earlier—where people live, the kind of work that they do. And I think that's another very important area because it allows us to put faces and names more clearly into the real devastation that the report talks about.

Michael Lerner: Any reflections on Susan's comments?

Margaret Kripke: I think that that's one of the points that struck us as well. In fact that was one of our major conclusions from the report—that children are at special risk, for a lot of reasons. They're developing. They're smaller than adults, and so on. They are certainly at greater risk, and the evidence is accumulating that there is an increase in cancer in children for no apparent explainable reason, and also an increase in the number of birth defects in children. I think that's an extremely important canary in the mine, if you will. And also, the point about the impact on underserved populations is only going to contribute to what we already know are huge disparities in cancer incidence and in cancer outcomes in underserved populations and populations in lower socio-economic groups. So those I think are the really important targets of the report. We need to do more in those areas.

Michael Lerner: Let me ask you a question that really perplexes those of us who've worked on the cancer prevention side for some time, and particularly those of us who have followed the issues of endocrine-disrupting chemicals, which you address, which at low levels can either

directly or indirectly potentially contribute to cancer—directly perhaps as carcinogens, and indirectly perhaps as obesogens, which contribute to obesity which in turn is a major risk for major cancers. So the question for you as a scientist is, how do we need to think about our paradigms of cancer research when we are living in a real world in which endocrine disrupting chemicals in combination with electromagnetic fields, radiation exposures, poor nutrition, stress, income disparities—a host of things—suggest that even in a set of diseases as complex as cancer, different people may develop, for example, an identical breast cancer through different combinations of sources. And so, if that’s the case not only with cancer, but also with birth defects, learning disabilities, infertility, asthma— a range of epidemic or near-epidemic conditions of our time—how do we study this as scientists? In other words, how do we ever know if it’s not 6%, if the evidence will show that it’s more? How will we ever know what the contribution of environmental contaminants to cancer incidence is?

Margaret Kripke: I think we need new methodologies with which to do that. I am not an epidemiologist, so I’m not exactly the right person to answer that question, but I think we need research on what methods do we need—what new methodologies do we need to study those complex interactions that lead to cancer? The second answer is that at the moment we have model systems in which we can tease apart individual contributors to the process. And that’s in fact what’s being done at the moment. A lot of the evidence that endocrine disrupters contribute to cancer came from animal studies showing that they can cause cancer in animals. And so there are a variety of approaches in existence to look at the cancer causing properties of certain chemicals. But putting it all together and trying to assess an individual’s risk of developing cancer when you’re talking about a lifetime of exposures and changing exposures is really very challenging. As I say, we need some good science in epidemiology on how to do that.

Michael Lerner: Had you thought much about the issue of endocrine disrupters before you joined the panel? Had that been an area you’d thought a lot about?

Margaret Kripke: Oh, yes. It’s not an area I have worked in, but I’d heard it discussed in many contexts previously. Yes.

Michael Lerner: Because in the world of science discourse that we work in, that’s been a quite central issue. And its implications, for example, for protecting Americans from cancer risk are really startling. If these very low dose exposures in utero can have lifelong effects, it poses tremendous challenges to all our regulatory regimes.

Margaret Kripke: I think that’s right. And you only have to look at the changes in maturation of young children and sexual maturity coming much earlier than it did fifty years ago, and so on, to want to ask the question, what is behind this? Certainly this is not a changing gene pool. It’s too rapid an onset to be something that is evolving from genetic alterations. So the other logical conclusion is that it is something in the environment driving this pattern. But the pattern is unmistakable. It’s very clear. And I think that gave some impetus to the endocrine disrupter hypothesis in terms of real biological effects.

Jeanne Rizzo: In the very beginning you talked about the precautionary versus the reactionary approach. If we have a model that you have to know something exactly with absolute certainty and proof in order for science to affect public health policy—and on the other hand we know we have a very complex issue here—if we hold to the model of waiting to understand exactly, we wouldn’t act. I think what you drew out in the report is that we have enough information to

act. We can act on the knowledge that we have, and we can remove those things that are known or suspected of causing harm. That may be how we prove the point. As you remove those things from the system, as you regulate them and take them out, then you begin to see the effect. We saw that with hormone replacement therapy, or at least we think we've seen some of it, where you remove something and you see a change. I wonder if you could elaborate on that, because you did weave it through the report—the idea of taking action with the knowledge we have, recognizing that it's a complex issue.

Margaret Kripke: I think that there are a number of things that are suspected or known human carcinogens that are in the workplace and in the environment that should be acted upon right away. And those are the low-hanging fruit, really. But it doesn't seem that there's an enormous amount of interest on the part of regulators to act on those. So that is clearly the place to start—where there are known things. Let me give you an example. Canada has banned pesticides for use in housing and landscaping, so people have used other methods for pest control on their flowerbeds and vegetable gardens and so on without much adverse effect. That was a decision that was made at the national level that hopefully will reduce cancer-causing agents over the future. I think there are some things like that that we could do here that we just have to have the will to do.

Michael Lerner: Looking at your recommendations, the very first one, as you mentioned, is that: *a precautionary prevention-oriented approach should replace current reactionary approaches to environmental contaminants in which human harm must be proven before action is taken to reduce or eliminate exposure.* How did you conclude that that's where your recommendation should start, since that's such a major policy issue in America today?

Margaret Kripke: It's the thing that would probably have the most impact on future generations—to quit putting things out there that are untested and then have to bring them back. It was described to us as looking at the end of the pipeline. You have a process—a manufacturing process—that produces a chemical or something that goes into the environment and it comes out of the end of the pipeline and is distributed. To put it back in is very difficult. The remediation of things that are already out in the environment is much more costly and much more difficult than having engineered the manufacturing process from the very beginning to not create toxic by-products and to not create toxic products at the end. There are classes of chemicals that we know potentially have these properties. Pesticides of course are one of the better examples of that. In those cases where there is a high potential for risk, we ought to be thinking about that at the beginning, not at the end after it's already on people's carpets and on their lawns.

Michael Lerner: And your second recommendation, again bold in the current policy environment: *a thorough new assessment of workplace chemical and other exposures is needed to quantify current health risks. Previous estimates of workplace cancer risks are outdated and should no longer be used by government or industry.* Workplace chemical regulation in America has not been a subject of great attention for some time. So, this again is really a marker.

Margaret Kripke: I don't think there's been a serious workplace assessment for quite a long time, and it's not even clear that appropriate records are being kept so that we could track health effects in various industries. There has been a study recently in Scotland, where they have concluded that 8% of cancers in Scotland are due to occupational and industry exposures, that's

in males, and 1 ½ percent in females. They've limited that to just looking at industrial exposures, and they limited it to six different cancer sites. It didn't include anybody in the general population. So it's clearly an underestimate, but it shows us it's possible to do those kinds of assessments. Other countries are moving ahead in that arena. We need to be there too.

Michael Lerner: Jeanne—additional questions or comments?

Jeanne Rizzo: I wanted to get back, if you would, to some of the research recommendations. One of the things I was struck by was your call for banking bio-specimens and high-throughput screening. Those are things that we've been talking about in this field for awhile, because testing one chemical at a time will take—I don't know—we estimated how many centuries to get to the first ten percent. And the failure of investment in that kind of research and the foresight to include things like bio-specimen banking. So I was just wondering if you could talk to us a little bit about what you learned, and what you'd want to communicate about that.

Margaret Kripke: We did hear some testimony that there are some new high throughput screening methods that would enable testing of large numbers of compounds rather than the one test one chemical at a time with the four year animal study and so on, which is totally impractical. We will never catch up with the backlog, nor can we keep up with new chemicals that are being put out every year. Unfortunately there is not a lot of support for research of that kind. That's the other part of the testimony that we heard—that it's extremely difficult to get funding agencies to fund that kind of research. So I think it's extremely important that we change the focus of research in the cancer field and take some of the focus away from treating advanced disease and put some of the focus on the upstream part of the equation—because that's where all of the lifesaving is. The money saving and the life saving is when you prevent cancer or you detect it early, not at the end of life diseases.

Michael Lerner: Given that that's such an obvious conclusion, why is it, do you think, that it's so difficult for a national cancer research agenda largely funded by taxpayers to move in that direction? It's not as if anyone is suggesting abandoning research on advanced cancers. But somehow it's been so difficult, in America particularly, to move even a small portion of the resources into primary cancer prevention and environmental cancer prevention.

Margaret Kripke: I don't have an answer for you to that question. I think the answer is complex. One is, it's easier to generate a lot of concern and a lot of support for curing cancer. We have talked for decades in this country about the war on cancer, the cure for cancer. That has been the focus, and people are energized around that agenda, as they should be. It's much more difficult to say let's look at causation of cancer, because the immediate effects are not apparent. You know, there isn't an immediate outcome as there is in a life-saving cancer therapy, for example. So, I think it has to be a philosophical shift in terms of what you want to support. And this is taxpayers' money, and taxpayers want to cure cancer. And I don't think there is as much public pressure on preventing cancer or early detection of cancer as there is on curing cancer. But that's where it has to come from. It has to come from the American public.

Michael Lerner: Susan—other questions and thoughts?

Susan Braun: I think wrapping that into what you said earlier about the kinds of regulations and laws that there are in Canada, that there are in Europe, and that aren't in place here. That

speaks to the public will for looking at prevention, for taking a precautionary approach, and for looking upstream. We don't seem to have that same interest in this country, or at least the majority interest doesn't seem to be there yet. I know the answer to why that might be is complex, but any thoughts from what you have discovered about how that might change, whether it might change, courses of action that are important?

Margaret Kripke: It will only change if there is public pressure to do so because there are a lot of economic interests in the world that are geared toward not having that happen. And particularly in today's economic times, you don't want to do anything to impair business and the growth of business, and all of these things are viewed as having a negative impact on business and productivity. So that's what you're fighting against. Again, that's why I am convinced that the only way to really change this is at the grass roots level. If people demand it, it will happen. That's how we got more money for cancer research. People demanded that we would spend more money on breast cancer, for example. And they demanded that more money be spent on prostate cancer. So, the public has the ability to change the federal agenda. They haven't done it here yet, but I'm hoping that this report will stimulate some action in that regard.

Jeanne Rizzo: When you talk about the economic issues involved, there are those who believe that the best approach to cancer prevention might be investment in green chemistry. Because that would shift the economics of it. If we could create safer products and it could be profitable, then we could move the system, because there is such a big economic influence on it. I liked your approach in the report to not only talk about the value of green chemistry, but the necessity of insuring that those alternatives truly are safer and also scrutinized. You spent time on the green chemistry piece. I wonder if you could comment on that.

Margaret Kripke: It just seemed very logical to us that that's what needed to be done. I know that there are state initiatives to try to put more emphasis on green chemistry and on manufacturing processes that would provide safer products. There's always a danger when you do that that the substitute that you are creating also has its own problems. We saw that with the reduction in chlorofluorocarbons for example. When we got rid of the chlorofluorocarbons, some of the substitutes also had health effects and environmental problems. So when you say we need safer alternatives to certain pesticides and chemicals and so on, we need to keep an eye on whether those safer alternatives are truly safer.

Michael Lerner: When I look at the section called *Reducing Environmental Cancer Risk: A Call to Action*, and just the major headings under it:

- *We need to determine the full extent of environmental influences on cancer.*
- *The nation needs a comprehensive, cohesive policy agenda regarding environmental contaminants and protection of human health (not just cancer).*
- *Children are at special risk for cancer due to environmental contaminants and should be protected.*
- *Continued epidemiologic and other environmental cancer research is needed.*
- *An environmental health paradigm for long-latency disease is needed.*
- (speaking of endocrine disruptors): *Existing regulations for environmental contaminants need to be enforced and updated; stronger regulation is needed.*
- *Radiation exposure from medical sources is under appreciated.*
- *Medical professionals need to consider occupational and environmental factors when*

diagnosing patient illness.

- *Workers, other populations with known exposures, and the general public require full disclosure of knowledge about environmental cancer risks.*
- *The military needs to aggressively address the toxic environmental exposures it has caused.*
- *Safer alternatives to many currently used chemicals are urgently needed.*

How can I say this? It's an extraordinarily visionary, comprehensive response to the set of hearings that you held. Presumably, neither you nor LaSalle, in terms of your background or academic lines of work—perhaps I'm wrong—but perhaps that breadth of creating an agenda and a call to action of that breadth, must have been a very challenging thing. It must have been challenging to look at the research that you heard about, and then come to such a comprehensive and to my mind deeply thoughtful set of conclusions. Was that a challenging aspect of the work?

Margaret Kripke: Yes, just because of the breadth of the topic, for one thing. And we spent probably as much time discussing the conclusions and recommendations as we did on anything else in the report, because we wanted to make sure that we captured all of the crucial elements there, such as the people exposed to radiation from military sources, you know. We wanted to make sure that it was comprehensive. And at the same time, if you have a laundry list of fifty things it loses impact—it loses emphasis. So trying to get the right balance there was challenging. I should also say that the President's Cancer Panel is blessed by having an exceptionally good staff. These are researchers who follow up on the literature, they check all the facts, people presented white papers as part of their testimony, they checked all the references and made sure that they were coded correctly, and so on. So between having a very expert staff helping to put this together and also an extremely talented and experienced writer who actually puts things into words, that is enormously helpful and they contributed significantly to the report—it was not just LaSalle and myself.

Michael Lerner: Jeanne Rizzo—any final thoughts or reflections or questions for Margaret?

Jeanne Rizzo: This report goes to the President of the United States—to the administration. You have the history of having reports and delivering them to the President. Is there an expectation of a direct response or an indirect response, when the President gets this report? Do you have the sense that the administration has heard it? What are the opportunities for presenting or the response loop on that?

Margaret Kripke: Typically we do not get a response from the White House and the report is not delivered personally to the President. It goes through staff assistants to the White House. We have not heard back from the White House. We occasionally hear from some of the government agencies but not often. And I must say, I guess I'm a little surprised that there has been no response from industry or from government agencies. And I'm not quite sure how to interpret that.

Susan Braun: As I look at this and all that it is and all that has gone into it, it strikes me as extraordinarily important, not only for people who are living with cancer right now, but for all people who are at risk for cancer, which is pretty much all of us. And that what you've done here can help us not only encompass that extraordinarily important look at what do we do with individual people who have cancer today, but what we can do for all people who are at risk if

that action is taken at a much larger than individual level. This can impact real lives—and I think that that is clear. I'm hopeful, as you said, for people to come forward to say this is something we must pay enormous attention to. That this human level of understanding and the ability to diminish suffering can be touched upon, can be understood, can be grasped, and potentially can be put into practice.

Margaret Kripke: Well, that is actually one of the reasons that there is a separate section in the report that says things people can do. What can individuals do to reduce their personal risk of cancer? Because you can't put out a report like this and not give people some clues as to what they might do. Protect children. If you work in an industry with chemicals, wash your clothes and take your shoes off before you come into the house—little practical things that people can do which I think are very important. I participated in an interview for public radio on which a questioner called in and he said, "I've never smoked in my life, I'm extremely healthy, I run marathons, there is no one in my family who has ever had cancer, and I have cancer. What about me?" And so people who say don't look at environmental causes of cancer because there are other things that are more important, what about these people? And I thought, that's a very telling argument, and people do need to have their concerns addressed, and I hope the report does that.

Michael Lerner: Margaret Kripke, thank you so much for this conversation. Are there any final thoughts and reflections you'd like to offer, or do you feel that you've said what you have to.

Margaret Kripke: I think I've said what I have to say.

Michael Lerner: We are deeply grateful to you and honored and grateful. I can't tell you how many people around the country and around the world who have devoted themselves to health promotion and disease prevention will be forever grateful for your report. So, we just thank you so much for all the effort that went into creating this.

Margaret Kripke: Thank you.