Panel Discussion
"Environmental Risk Communication"

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Koide: Today we have a discussion under the theme of "risk communication." The "risk" in our topic today refers to a danger with a certain probability of occurrence as opposed to just any danger. It is a question of whether or not a certain level of danger is tolerated relative to some alternative - that is the kind of danger at issue.

Take, for example, the automobile; it gives us a highly convenient means of transportation, but in return for this benefit, about 10,000 people lose their lives on Japan's roads every year. The danger or risk represented by roughly 10,000 traffic fatalities is the price paid for our use of the automobile, on which our very way of life depends. This is the type of danger denoted by the word "risk." People are willing to assume a bigger risk for a bigger benefit, but not for a small benefit.

In terms of communication, though there are many elements involved in communication, I think four of them are particularly important.

The first is the delivery of some message. This requires facts. The focal question is the nature of the "fact" that one side wants to provide and the other side wants to receive.

The second is timing. It is crucial to choose the right occasion for providing the information.

Then there is the question of how to convey the message. It might be in simple terms at one time and in a manner designed to stimulate interest or amuse in another. The sender must decide what perspective to apply and what point to make. At any rate, the manner of provision is a third important element.

The fourth one is the condition of the receiving party. If that party is in no condition to receive the message, the fact will not be delivered no matter how well-timed and skillful the delivery is.

In the aspects of both quantity and quality, information is best furnished when these four elements of fact, timing, manner of delivery, and condition of the receiver are all present and in the right configuration. This also applies to provision of information on risks as our topic today.

Risk communication has emerged as a new concept. In recent years, there seems to have been a gradual increase in factors of uncertainty and causes for concern. More specifically, events such as the Great Hanshin Earthquake and sarin attacks on the subway showed all people in Japan that risks are by no means remote from our lives and can arise anywhere. I believe they have greatly enhanced sensitivity to and awareness of risks among us. I would like our discussion today to take up the issues of how we should view the risks posed by environmental endocrine disrupters (popularly known as "environmental hormones") against this social backdrop, and how we should communicate them.

To begin, I would like to ask each one of our panelists to make a brief comment on what he or she regards as most important about risk communication in the area of endocrine disrupters, together with some remarks by way of self-introduction. I want to use these as general

headings that will serve as springboards for more in-depth discussion. So, please say a few words about what you see as the most critical point in connection with endocrine disrupter risk communication.

Let's start with Mr. Iguchi. Mr. Iguchi, if you please.

Iguchi: For quite some time, I have been involved in continuous research on questions such as how estrogen causes cancer in genitalia. As I see it, the biggest cause of confusion in risk communication on this topic is that substances with a high residual power or toxicity, such as dioxin and PCBs, are lumped together with others in discussion. Distinctions ought to be drawn in communication.

Iwamoto: While I am in charge of environmental safety affairs at Mitsui Chemical, I also head working groups on endocrine disrupters for one of the organizations in our industry, namely, the Japan Chemical Industry Association. I also head the dialogue committee of the Japan Responsive Care Council, which is a related organization of the same association.

To view Mr. Koide's question from my standpoint, I believe that the most important thing is to present facts accurately and in a comprehensible manner enabling people to make decisions for themselves and hold converse with them.

Koide: I think the objectivity of those "facts" will be a topic for discussion later on.

Sakita: In my work, I always take the perspective of the general public and collaborate with others in action as an environmental counselor. Right now, I also serve as the secretary-general of a nationwide network formed by all kinds of people hoping to build recycling-oriented communities and the leader of regional activities, and would like to comment from that vantage today.

To build recycling-oriented communities, I think it is especially vital for companies and consumers to engage in an ongoing and close communication in the process. Consumers still have a lot of concern about endocrine disrupters, and I think we have to do a little more to foster the growth of such partnership and mutual trust. I see this as important.

Endo: I am here today in my position as one involved in education. Although I am not an expert in environmental education, I want to spread knowledge about the environmental problems of my own interest among the children, and have been making progress, a little at a time, to this end.

I now teach a class of second-graders. As might be expected, in my occupation, the point is to obtain easy-to-understand information for both teachers and their pupils. To the extent that classrooms are venues of communication, I guess it is also vital to think about how to manage the class and convey the message.

Adachi: I am in charge of countermeasures for chemical substances in the Environmental Health and Safety Division of the Ministry of the Environment. My own personal background is public health. For more than 20 years since graduating from university, I have been involved in various branches of administrative services in areas such as public health, environment, and science and technology. For this gathering, I have been reminded not to give bureaucratic explanations, and I intend to do my best to voice purely personal opinions. But there is one thing I'm worried about: having my words taken for official Ministry pronouncements (laughter).

Since I am the fifth person to venture an answer to the question of what is most important in risk communication regarding endocrine disrupters and would otherwise not have much to add, I would like to make a more abstract comment. The word "rapport" is often used in the sphere of medicine. It refers to mutual understanding and communication between doctor and patient as equals. In my view, the most important question is how to forge bonds of trust without blind faith in the other party.

Koide: You mean informed trust; I suppose that would be part of the final aim.

Let us now go into the particulars. We have a lot to communicate and learn about the risks of endocrine disrupters. What do we know, and what don't we know? I imagine what we most want to know is whether or not the associated risk is tolerable.

What do you think, Ms. Sakita?

Sakita: Actually, I saw the results of a questionnaire survey on endocrine disrupters just the other day. In one of the questions, respondents were asked to indicate the environmental terms of greatest interest or concern to them. Among the 600 respondents in the Tokyo metropolitan area, the top response was "air pollution," but the second-ranked one was "problems related to chemical substances such as dioxin and environmental hormones." It was selected by some 61 percent, and this underscores the high degree of interest. The selection rate was even higher among married women, and particularly those in their 30s, at about 70 percent. This hints at the existence of grave apprehensions about the possible effect on the lives of themselves and their families once they become pregnant, give birth, and raise children.

There are all sorts of data showing an influence on animal life, and people are naturally wondering about the effect on their own life. What should we do to prevent any adverse impact on our children? I suspect that this area is the biggest source of concern.

Iwamoto: In connection with what Ms. Sakita just said, I must note that all kinds of substances are listed as endocrine disrupters on, for example, materials from the Strategic Programs on Environmental Endocrine Disrupters '98 (SPEED '98), which has been coming up a lot. Items such as dioxin and PCB, which Mr. Iguchi mentioned a little earlier, and tributyltin along with ordinary chemical substances. In terms of toxicity, this is like putting sumo wrestlers in the yokozuna and ozeki classes on the same footing as those on the bottom rungs who have just entered that world. I imagine this has caused a lot of confusion among consumers, and was reflected in various consumers' behavior taken as a result.

Subsequent studies made a number of things clear. Test results showed that, for example, some substances had an impact even in low dose, while others did not. I consider it crucial for such findings to be conveyed accurately to the public.

Koide: It would be a demanding task indeed to provide information about each and every development. What do you think about this, Ms. Endo?

Endo: Only three days ago, I was chatting with some children who were in the classroom after school let out, and one of them started talking about a rubber eraser. He said that one of his classmates had bought an eraser with a nice fragrance, and urged me to have him let me smell it myself. At this, one of the other children exclaimed that his mother refused to buy such an eraser for him because erasers which don't lose their scent give you headaches and are not good for your health.

The conversation ended with me wondering, along with the children, about whether stores would sell erasers that were harmful to health and whether the erasers were actually harmful. I realized then that I did not have information which I should have had as a teacher.

Adachi: I was going to comment on Mr. Iwamoto's remark, but decided not to do so because I can speak with him any time. Instead, I would like to say a few words about what Ms. Endo just said.

I believe we all know that it is no easy task to say just which substances are safe and which are not.

One observation I would like to make is that many people wrongly believe scientific judgments are perfectly objective. This is one of the ten misunderstandings about risk communication listed by Professor Urano of

Yokohama City University. The end of objective, scientific data does not mean that exactly the same results will be obtained by any and every scientist. As such, scientific data as to whether levels are safe or not will themselves vary depending on the perspective of people who send it. This is one point.

Another is that the question of safety has two components: whether or not there is a danger on the order of a hazard, and whether or not we are on the safe side as regards levels of exposure, that is, in terms of risk. Both of these components have to be considered in looking at safety.

Koide: I take it that hazards are pure dangers, while risks are dangers with a certain probability of occurrence. Risks have to be viewed by measuring the danger against the benefit. There has been a lot of research in this area since 1998 in the context of SPEED and other programs. Mr. Hamanaka mentioned a little earlier that they had found an impact on fish but not on mammals. What people most want to know about the risk in this sense is whether or not the levels of endocrine disrupters in Japan at present can be considered tolerable. What do you think, Mr. Iguchi?

Iguchi: I think you asked me the toughest question (laughter).

As I recall, there is a specific difference in the case of fish. Clear gaps emerge for alkylphenols, such as nonylphenols and octylphenols, which bind to fish (Medaka) estrogen receptor at 100 or 500 times as high as in the case of human estrogen receptor.

Testing with rats, on the other hand, did not find any significant change at low dose. By the same token, we must remember what Dr. Tsutsumi said a little earlier about how all sorts of substances enter the system in the fetal period. There may even be an influence before this period, meaning on sperm and ova. Taking all of this into account, we could not say that there is absolutely no problem.

For this reason, to your question about whether or not there is a risk, I would have to reply that we don't know. I estimate that, with the exception of PCB and dioxin, most of the substances called endocrine disrupters would probably be safe or unsafe depending on the level of concentration. I cannot give an unequivocal reply on this point for now; all I can say is that we shall continue researching it.

Another question is how to view the matter. People are looking for a yes-or-no answer, but I don't think it is possible to furnish one. The researchers themselves do not have a good grasp of the facts. Therefore, the people listening to them are bound to get the impression that they don't make a lot of sense. As for steps that can be taken right now regardless of this uncertainty, we must devise ways to reduce our intake of chemical substances which we may assume are entering our bodies. While we research the question of safety, I therefore suggest that we take approaches to cutting down the amount of unnecessary chemical intake.

Koide: So it is not a question of definitely stating whether or not there is a risk; if anything, one would have to say there is. Viewed from a scientific standpoint, there can be no doubt about the adherence of certain substances to receptors. The question is whether the risk is tolerable when considered in conjunction with the benefit. May we assume that it is tolerable? Should we move to phase out substances whose risk is not tolerable? How much do we know about this?

Iguchi: Although it is not directly connected to endocrine disrupters, I'd like to mention the case of the two plasticizers diethylhexyl phthalate and diisononyl phthalate. I believe you may have read in the newspaper that the Ministry of Health, Labor and Welfare banned their use for items coming into direct contact with food, such as the PVC film gloves worn when handling deep-fried foods. There is another substance that has often been used in objects for teething, for example. Its use for toys liable to be licked or bitten by children is now prohibited. Steps like this are taken if data from animal tests reveal the presence

of toxicity in a concentration exceeding the hundredth part when multiplied by the safety coefficient for it. Because children may absorb concentrations in excess of this mark or very close to it, it is prohibited to use these two plasticizers in toys made for biting by children or items brought into direct contact with food. They are already regulated by law. So we are also seeing this kind of development.

In other words, the situation is fairly clear when we have toxicity data for the substances. But when things are not very clear, the judgment as to relative risk and benefit still lies in the future, especially considering the convenience offered by chemical substances. As things now stand, I just don't know about range of tolerance.

Koide: I take it that there is a lot we don't understand about many substances, but that we do know quite a bit about some and need not worry too much about them in our daily life. I assume that we can live with them by taking the kind of care you mentioned. Of course, we would have to eliminate those such as dioxin, which surface very much unintentionally. I get the idea that, at present, we can view the matter in this light. Is this view correct?

Adachi: Yes, I believe it's just as you said. We know about only an extremely small number in terms of the total. The issue is, instead, what to do about those we don't know. Some might think that we could merely accelerate our efforts to elucidate all of them, but there is simply not enough time for that. There are a massive number of chemical substances out there, and the task may take decades or even centuries. As I see it, the importance of risk communication has come to the fore in response to the question of what should be done in the meantime.

Koide: The substance of risk communication lies in clearly conveying the presence or absence of risk and defining what are risks and what are not. This cannot be done if the facts are not known.

Adachi: Conversely, at that stage, that is, once risks are known, there is naturally a need for communication, but I think that a one-way provision of information would also be effective to a certain degree. To my mind, communication has come into the limelight because we have to figure out how to inform people precisely about what we aren't sure of.

Koide: I understand what you are saying. In communicating, we also have to convey that we don't know what we don't know. The question is how to go about communication inclusive of such cases. There is no way to communicate what is unknown. The only thing to do is to inform people as to what it is we don't know. I think this is an important point.

Sakita: You talked about how to live with these substances and risk. That is what consumers most want to know. They don't know how to live with all sorts of problems. Scientists do not make definite assertions when they are not 100-percent certain, and this results in more uncertainty for consumers. In order to foster better understanding, we have to make venues for constant and mutual communication between scientists and consumers to convey the worries of the latter to the former as opposed to only a one-way flow of information from the former. I suspect that this will help to reassure consumers and serve as a means for ongoing thought and communication about how to live with the situation.

Koide: That is also true. I want to take up such systemic arrangements a little later on.

Iwamoto: It cannot be denied that there is much we don't know. As Dr. Iguchi said, the fact is that, even if pressed for a yes-or-no answer, we cannot furnish one. I am not a scientist, and when I talk with consumers, I tell them about the trend of improvement relative to the past or the current situation in Japan compared with that in other countries. I think comments on these areas help to reassure them.

On the subject of dioxin, for example, I mention that the amount of dioxin entering our bodies today is only about one-third as high as it was 20 years ago. I believe there are also traces of dioxin even in mother's milk, but this, too, is probably only one-third as high. As I recall, the levels in mother's milk in Japan are much lower than those in many European countries. I think these evaluations relative to other countries are a way of alleviating concern.

Consumers aren't going to understand information if it is too scientific. I think we should instead try to do a good job indicating how Japan stands at present.

Koide: That could be another approach. I understand that Japan's dioxin standards are not so strict, however.

Iwamoto: No, what I mean is that the actual amounts of intake have been gradually declining.

Iguchi: One problem is that there is almost no information on the level of emissions of a given substance in a given type of usage. As a result, things have to begin from items such as the chemicals that are or are not emitted from given objects and what they are made of. Because such information is probably not available, people may ask whether it is safe to put deep-fried foods in the container at issue, heat it, or place it in a microwave oven. What they usually mean when asking about use in a microwave is whether the shape will be deformed, not whether the container will leak chemical substances.

To people who are worried about leakage, this type of information would consequently be extremely vital as a basis for decisions. Another approach therefore could be to make efforts to prepare such information.

Koide: Depending on the circumstances, on the other hand, there is some benefit involved. For example, nonylphenol and other substances can be used to make plastic and are included in its composition. Modern living without plastic is basically unthinkable, and we are therefore in fact getting a benefit from these substances when we use something made of plastic. People are going to get very apprehensive when there is a flap about the problem of nonylphenol without any attendant information on the mode of use. There should be a little fuller communication on how things are to be used.

Sakita: In this connection, I would like to mention that we consumers, when talking with each other, often mention the principle of prevention. That is, of course, easiest for consumers to understand. It makes perfect sense to take preventive measures today if the danger tomorrow is not entirely clear. I therefore perceive a need for more in-depth discussion and detailed information on which of the things we actually use should be avoided or how we could use them without any risk.

Iwamoto: I agree. I like to cook myself, and sometimes hesitate to put some containers into the microwave. I am the kind of person who sometimes can't decide whether to buy leaf mustard priced at 198 yen or that priced at 150 yen. In the case you mentioned, however, it would be extremely hard to identify exactly which things are dangerous.

I have here a PET that is supposed to produce hardly any elution. There are however reports of transfer of chemicals to the contents of canned goods. Nevertheless, if specific safety standards have been established, we can inform consumers that any emissions are no more than 1 percent as high as the standard. Conversely, as Dr. Iguchi said, there is a lot we don't know about this field yet, and it is better not to create a big stir among consumers, who would be looking for a clear-cut yes or no.

I think the risk is something that must be measured by each individual in accordance with his or her priorities and values. From what I've heard on various occasions, there is a big difference between experts and lay people in respect of how they perceive risks. Perceptions could also change completely depending on the

individual's wants and desires. For example, people who are overweight might be strongly drawn to diet foods even though suspecting some sort of adverse influence from them. In the final analysis, I therefore think the matter will come down to judgments made by individuals based on the information available to them.

This also applies to the principle of prevention; while perceptions of it vary with the person. It is said that companies may be pressed to take more preventive measures, but their subsistence depends on cooperation among a diversity of parties, including their shareholders. They want to avoid causing loss to these parties at all costs. Therefore, they are likely to do their utmost to check safety by investigating areas of uncertainty and avoid anything that could be unsafe.

I must add, however, that this depends on the decision taken by the leadership at the time; it would be hard to induce consistent behavior in one direction or another. The important thing is to engage in repeated dialogue on such trials. In the process, I think Ms. Sakita and I, for example, would eventually come to a kind of trust in each other's statements. A single conversation is not likely to produce a constructive discussion. We in the chemical industry have prepared a forum for dialogue with consumer groups once or twice a year. There are about ten representatives on each side. We sit at a table and talk about a variety of subjects, and a mutual trust gradually arises as we do. We on the industry side realize that we have to listen carefully to what the consumers are saying instead of giving an explanation to them and expecting them to understand our position. Repeated dialogue of this nature is, I'm afraid, all we can do.

In the end, if a nice and neat answer cannot be found, everyone will have to find an answer of their own, or reach some kind of conclusion in order to continue enjoying a certain benefit.

Koide: People would have to have a lot of information to make judgments on risks.

Adachi: It is just as Mr. Iwamoto says; there are a lot of things that are not known in the scientific sense. Furthermore, response to even facts varies depending on the values of the listener. This raises the question about how to go about risk communication. Facts are said to be one of the four crucial elements, but they are only one of the four. To put it a little strongly, I think that facts may not be so important in certain cases.

I recall what an NGO representative said the other day. While admitting that companies are now putting out in-depth environmental reports that are filled with facts on their activities, he said, "they had absolutely no credibility - they undoubtedly present only the good news. "What we believe in is attitude - the attitude of firms seriously attempting to provide information and reduce risks, the attitude of the people presenting the report. We take a look at the attitude before placing our trust in a company - not the facts." It struck me that this was another aspect of risk communication.

Koide: Is that so? It sounds as if some kind of force of personality is needed to convince people.

Iwamoto: To a certain extent, I think the industry side can agree with what Mr. Adachi said. The question of whether or not a substance is safe is very much in a gray zone. What we have to do is figure out how to bring things closer to the safe side.

In our efforts of responsible care, we are constantly working for improvement. We can point out how emissions of chemical substances, for example, have declined over the years. The aim is to get a trend with a declining curve. In talks, we have to be sure to lay out the facts in plain speech. In addition, since the communication would be one-way with presentations alone, we have to listen closely to the views on the other side. This is the first step to forging ties of mutual trust. The facts are important, but we also have to get people to understand what action the company has taken over the years.

Koide: There can be no doubt that an underlying trust is a critical factor in communication. In the process of building trust, however, companies cannot expect consumers to trust them even though they talk face-to-face unless they clearly set forth what they do and do not know. It would make absolutely no sense to try to develop communication otherwise. The four elements I mentioned at the outset may be regarded as multipliers, in that the product is zero if any one of them is zero. I think this is a little different from what you said, Mr. Adachi.

Sakita: I found what Mr. Adachi said very persuasive. This is because I think companies have to create a setup for full disclosure of information and notify consumers of it or even use it as a forum for communication to breed trust. It is not a matter of force of personality or familiarity after meeting several times, but of standing arrangements for disclosure.

Koide: But only if there is discussion of the facts. It won't do to skip that part because it is difficult - isn't that right?

Sakita: Right. I can give a relevant example. I am involved in various community activities, and happen to be a resident of Tokyo. Tokyo is taking part in one joint project with various municipalities. Within this project, some firms stage gatherings where local residents are invited to go through their environmental reports. These gatherings are now being staged on a regular basis.

In such programs, the residents of the surrounding area first visit the company's plant for a tour of it and then hear a presentation of the report. At this stage, they usually do not have any particular questions, and interaction is not up to the level of communication. Nevertheless, this goes beyond the mere disclosure and preparation of in-depth reports; the companies are trying to use the reports as a framework for communication. I felt that was doing a lot to build trust.

Koide: Ms. Endo, the discussion is now coming to the subject of people sizing up information for themselves. It's a pretty difficult proposition, isn't it?

Endo: Yes, it is. I have begun to see that the requests of us teachers for provision of more information to use in the classroom are not going to make much headway when the scientific community is so much in the dark. From the discussion here today, I realize how much I have to learn.

I understand the lack of information, but I would like to mention a difficulty I had before. It involved tableware used for school lunches in elementary schools in Hiroshima. About five years ago, the city took action to give the children better food and serve it on tableware that was more attractive and would better keep hot foods hot. For this reason, it prepared some pretty plastic ware decorated with pictures of oleander, the city's official flower. At first, we were happy about getting such lovely dishes and remarked how it would make the lunches seem more appetizing. But about a year later, we heard about a risk of leakage of some substance - I believe it was bisphenol A - from them. In response, we were told to stop using the ware. Next, we had to explain the situation to the children. I remember not being able to tell them just what was wrong with the dishes.

So, I told the children that we were going to stop using the dishes because they were emitting something harmful to health and therefore were a little dangerous. It struck me how none of the children asked whether they had nothing to worry about even after using the dishes so far. As might be imagined, children at that age generally have no choice but to accept what the teachers tell them. As far as that is concerned, I remarked about what a problem this was because we are teaching the consumers of the future.

Koide: That happens. When some practice is suddenly found to be wrong, a switch is usually made right away because no one wants to be criticized for doing otherwise. That kind of thing

often occurs. It also makes for a timely discussion of such issues.

Iguchi: I would speculate that the ban on that tableware was imposed by the prefectural government. When I was serving on the Yokohama board of education, we once dealt with the question of how to cope with the same kind of occurrence. At the time, we had no idea of the emission level. The material was polycarbonate, and the substance was bisphenol A.

As for what we did, I must first note that all of the tableware used for school lunches in Yokohama is replaced over a period of six years (i.e., not used longer than six years). Therefore, we went to a school and assembled an entire set consisting of brand-new bowls and bowls one, two, three, four, and five years old, respectively. Then, we had the bowls filled with soup actually served for lunch and made measurements at the actual serving temperature. We gathered such data for hundreds of dishes, and found that cases of emission increased with the duration of use. For example, where no emissions were detected with five brand-new dishes, the number would gradually increase with the dish age. The emission levels, however, did not increase much. In sum, the testing revealed an increase in the number of dishes for which emissions were detected along with the number of years in use, but the levels were in any case very scant.

The PTA, however, wanted an immediate halt to use of all of these dishes and roundly criticized us on several occasions. One time, a parent came up to me to talk while taking sips from a hot canned coffee beverage. "Excuse me," I said, "but did you know that the emission levels from the coating on the inside of the can you're drinking from are thousands of times higher?" He replied that it didn't bother him because he was drinking the beverage of his own accord. Parents felt a keen anxiety when it came to their children.

On the board, there was a consensus that we did not necessarily have to stop using the dishes right away. At Yokohama, anyway, we left the decision up to the school principals, also informing them of the possible emission levels. A little before that, we learned that emission levels were somewhat higher in the case of dishes from a certain supplier. When we checked up on the matter, all the suppliers purchased materials from the same company. I don't know about the molding process, because they would not tell us about it - a certain degree of (confidential) know-how seems to be involved. At any rate, there were four suppliers, and the dishes of one of them yielded slightly higher emissions. The levels for the dishes from the others were very low - basically negligible. We decided to leave it up to the principals. A total change would also entail a switch at the facilities preparing the school lunches and washing and drying the dishes. We therefore suggested that any change should ideally be made when building a new school or remodeling the existing one. We also advised replacement with china for soup bowls and other dishes holding hot or oily foods. There you have my story of what happened.

In other words, at the time, when people did not know about the emission levels, the first impulse was to get rid of the dishes, just to be sure.

Koide: It was a case of a scientific problem combined with a policy problem.

Iwamoto: I am coming from a company that produces bisphenol A, so I would like to mention a couple of facts in simple terms for fear that it may appear to be designed to allow us to serve our own interests.

The polycarbonate made with bisphenol A is even used to make baby bottles. In Japan, it went almost completely out of use for baby bottles because of the slight elution of bisphenol A. However, baby bottles are still being made of polycarbonate in Europe and North America.

People get deeply concerned about the question of whether or not there is any elution, but this ties in with what was said earlier about toxicity versus danger and hazard versus risk. In the case of school lunches, for example, the elution may occur with a frequency of only one

out every three lunches. If people take an objective look at the issue, I think it is pretty clear what kind of action should have been taken.

In connection with the subject of education Ms. Endo raised earlier, I would like to mention that the Japan Chemical Industry Association is promoting a program called "Yume Kagaku 21" ("Dream Chemistry 21") along with Japanese chemistry societies and other organizations. This program includes weekend classes devoted to chemical experiments. Unfortunately, the classes are held only in Tokyo. Once a month, we invite children to observe chemical experiments. In this area, the company Kuraray has made the laboratory in its plant available for the classes and is conducting experiments for local children.

For the future, we want to develop activities whereby company laboratories, chemical societies, and elementary and junior high schools join together to introduce children to the wonders of chemistry and prevent them from starting to hate it.

Koide: We were talking about bisphenol; in a situation like that, people want yes-or-no answers. Is the substance being eluted or not? Is it dangerous or not? Will the school stop using the dishes or not? At the same time, however, the incident is also a good opportunity to deepen discussion on endocrine disrupters. Why is it that, in such cases, the discussion devolves to a choice between only two things and does not easily proceed to a deeper level?

Adachi: This is going to bring us back to the fact issue, but I believe it is not a question of a yes-or-no fact. A mechanism has not yet been firmly established for effecting genuine communication based on mutual trust in the end. I am not trying to pick a fight, but the only information out there these days is likely to be one-sided and brand things as either dangerous or not dangerous. I consequently believe that, from now on, we have to build a mechanism for a sharing of a wider variety of information among all concerned parties to encourage mutual communication and understanding.

The question is what must be done to this end. If we speak in self-reproachful mood, one problem is that the side with the information, be it companies or the authorities, has been apt to provide only the kind they believe the other side needs. There is liable to be a notion that releasing complicated data would only cause unnecessary confusion. This is another one of Dr. Urano's ten misunderstandings. We have to correct this kind of outlook a bit. That is one thing.

For another, I think, from now on, the citizens on the receiving end will have to become aware that they have to take this information and use it to make decisions themselves.

Iguchi: To go back to the bisphenol A problem again, before we investigated the matter, we contacted a lot of companies about it, and asked them about levels of leakage when the dish is filled with oil and heated. Not a single company could tell us. That meant either they didn't foresee such a problem and had no data on it, or had the data but did not want to disclose them. This made us on the committee very dissatisfied, too. We wondered why they were hiding things from us.

If they had merely said they didn't have any such data, we would have invited them to do the tests with us and told them we also had the funds for the testing. Instead, they flatly denied the possibility of any such problems and turned us down. We consequently decided we had to do it ourselves, and got all the material needed from the schools or whatever to carry out. Things are probably changing quite a bit now, as Mr. Iwamoto suggested, but that was the actual story around 1998.

Another thing is that bisphenol A is much more likely to leak from older objects. That is why dishes in school lunch programs are replaced in the sixth year. In the home, families should probably avoid using, say, mugs purchased when children were small to serve them beverages heated up in microwave ovens. This makes the emission level higher than normal. People would

feel reassured if someone would advise them to use mugs many years old only as pencil holders, for example. But no one provides such advice. On the contrary, plastic items that keep their shape and stay uncracked and unnicked year after year are liable to give the impression that they can be used forever, and so induce a false feeling of safety about them. Obviously, this can be a problem.

Sakita: Around 1998, when endocrine disrupters and dioxin came to the fore as issues, our citizen group realized that we had to do a little more studying on the subject in order to understand them. Because we could not get together all the time, we decided to stage a study group once a month. The group met six months in succession. The very first meeting dealt with topics such as how to live with plastic articles, and attracted the participation of Mr. Iguchi, too. Thereafter, we invited a professor from a national environmental research institute creating a highly sound waste treatment system, a researcher who is extremely vocal in issuing warnings about plastic, and representatives of the mass media. In sum, we had people from all quarters come to speak.

The sixth meeting consisted of a symposium with all of these parties. In the end, all of us really came to see that we had to listen to and learn from what everyone had to say, and eventually make decisions and take action ourselves on the question of how to cope with the types of problem brought up before. It took six months, but I think the attitude that we citizens, too, have to get a firm grasp of the subject is vital.

Iwamoto: I would like to make just one comment in reply to what Dr. Iguchi said a little earlier. At that time, the companies which denied any knowledge or data about the problem were probably telling at least half the truth.

This is because the plastic polycarbonate is subject to national standards about the level of elution and bisphenol A residue in use for tableware. No doubt the companies had confirmed that; they wouldn't have put the products out otherwise.

I think there was only test data on whether or not standards were met.

Koide: From his last comment, I gathered that Mr. Adachi really wanted to say how regrettable it was that the mass media are putting out such a flood of information giving only one side of the story. I would like to note that the media, too, are involved in a lot of competition and that all sorts of information tends to come out of it. Nevertheless, I guess my conclusion is basically the same: without a supply of solid information, the mass communications and media are at a loss, too.

I myself have been on the job for nearly 40 years. It's not limited to environmental endocrine disrupters, but I must've heard your line about not telling things to the public so as to avoid confusion dozens of times during this period. In other words, discussion essentially isn't given a chance in such cases. The picture has since changed quite a bit. In about the last year or two, people have finally begun to see that hiding or glossing over things only brings worse results. This goes for endocrine disrupters as well; the situation may very well change along with the mindset of the times. I sense we are moving away from a society in which the authorities decide matters for all and toward one in which we all make decisions together with everybody's understanding. I assume that the shape of communication on this problem, too, will change.

Adachi: I by no means hate the media. I get disgusted with them at times（laughter）, but they are basically of great value to risk communication. In particular, for awakening interest among the public, I think the mass media have a major role to play in the promotion of risk communication.

Koide: The occurrence of some incident - an event that bisphenol comes into question and the implications for dishes used in school lunches, for example - is also a golden opportunity for conveying the facts because of the high degree of interest. The way facts are conveyed and the

action taken by companies, scientists, and authorities on the occasion - for instance, whether or not they did their best to provide information - these things are, I think, ultimately linked to the growth of good communication.

What Ms. Sakita said about preparing a venue for dialogue is quite an important point. As I see it, this symposium is such a venue. I think it is also important in communities for members to try and take action on various levels if they have some doubts about matters. You said your action took the form of meetings for study. Does anyone have any proposals for the preparation of different types of venues of communication?

Adachi: I did not intend to toot my administrative horn, but you gave me a perfect lead-in. At the Ministry of the Environment, our promotion of risk communication revolves around the three pillars of compiling information, encouraging dialogue, and providing venues. On the front of providing venues, we have been holding round-table discussions on chemical substances since the last year. These discussions bring together about seven representatives of the citizenry, industry and government for talks on a range of related subjects.

To tell the truth, at first, one team or another would agree not to bring up some topic they thought would give ammunition to a different one. But since the last or next-to-last time, they have begun to foresee each other's reactions. Naturally, they continue to have mutually distinct positions and standpoints, but mutual understanding has deepened considerably and all teams are better able to discuss things without such undue apprehensions. I don't see why venues of this type, too, couldn't be developed on the local as well as national level to foster the growth of mutual understanding over the coming years.

Koide: National level, local level - there are all sorts of possible levels. Ms. Endo, how about the school level?

Endo: In connection with the school level, although it may be a little divorced from the main topic, I could mention that I tried out eco role-playing when I was teaching fifth-graders. It was not my idea. It was proposed by Ms. Fujimura. We would stimulate a discussion with the children taking different roles.

What I did was to pick topics, such as pulling the plug on electrical appliances to help the environment, together with the children. Then we pointed out that, while it was good for the environment, the habit meant extra trouble and was hard to practice. Finally, I assigned the children roles that differ from their own outlooks, such as consumers, electric power companies, and manufacturers of electrical appliances. The children were then asked to make statements from the standpoint of their role.

The children who were assigned the citizen role would, for example, stand on the corner and ask passers-by for views they could use in the class or question their parents about whether they pulled plugs on appliances not in use. Similarly, those assigned to speak for electric power companies would call their offices and ask for an explanation, if possible, of the company position on pulling plugs for the environment. Yet others would call up the city hall and electrical appliance companies to get corresponding information in advance. In the classroom, they assumed their respective roles and put forth views from those standpoints.

In the class, the children stood up and said, for example, "I am from such-and-such electric power company, and our position on the subject is like this." In response, children assigned other roles expressed their opinions in opposition, and the discussion went back and forth between them. At the end, I had them write about what they thought about the class. One child wrote that he had gotten into the habit of pulling plugs on appliances when not in use because he realized that waste deriving from standby power came to quite an amount in a year. He also said that, when he urged his father to do the same, his father said: "That's too much trouble for me, and if you have so much spare time, you could find something better to do with it yourself."

The children obviously found it more interesting than we had anticipated. They were given telephone cards to call companies, city hall and the general public to conduct interviews over the phone. The personnel on the other end apparently were kind enough to take the time and answer all their questions. Thanks to them, the children took interest, participated actively in the class and took active roles.

Koide: It is really important to impart the process of thinking about issues yourself through such activities. Perhaps you could make endocrine disrupters the subject of such a class, Ms. Endo.

Endo: In other classes, they held eco role-playing sessions on the proposition that people should shampoo their hair no more than once every three days in order to preserve the environment. Some concerns about the effect on environment and human health surfaced in them. One child said his mother told that it would not be good to shampoo too frequently because such substances might be absorbed by the skin.

Koide: Indeed! In the IT society, people are becoming able to get their hands on all the information they want, but the hard part is what to make of it. We might conclude that, without learning how to apply this kind of process in thinking things over, it might be difficult to make anything at all of the information we get.

Sakita: I think the class you just described was an excellent idea. From my work with information dissemination and environmental education on the community level, I have found that issues related to chemical substances are very rarely taken up in Japan today. In the programs and campaigns, for example, we talk about reducing refuse disposal volumes and, of course, preserving nature - important tasks, one and all. In our comments, we describe how all kinds of chemical substances are used to make the things that support our way of life, but how their use is now excessive and, on the contrary, beginning to pose difficulties for humankind. I think it is extremely worthwhile to bring up such issues right from childhood.

Koide: So the subject of excessive dependence on chemical substances naturally comes up.

Sakita: That's right (laughter).

Adachi: If you're going to draw your own conclusions, you presumably will have to have a good understanding of the concept of risk. Last month, we made some learning aids designed for elementary and junior high schools. One is a video game. The protagonist is a raccoon and various things happen in the game. We also made a role-playing game in which the player becomes the head of a factory and has to figure out how to manage it. Then there is a board game type in which items that had been very helpful suddenly cause difficulties. We prepared 500 sets respectively and they ran out of stock in just three days. They evoked a tremendous reaction. We made more, and they spent out as well.

That's when I realized just how strong the desires to teach such things and the wants for related aids could be in the classroom.

Koide: In other words, if the desires are there, you are prepared to respond to them.

Sakita: You mentioned the game in which players have to figure out how to strike a balance between environmental measures and corporate profits in running a factory. I have also been involved in such sorts of activities in the community, and I know that children around middle school age show a keen interest when material is presented in formats like the Game of Life. That's why I believe we have to provide more programs aimed at elementary schoolers and middle schoolers to encourage them to think carefully about these issues while at the same time considering matters on the other side, such as corporate activities and our way of life. The communication and thought should cover both sides. I think it is crucial to begin this right from childhood. That is how

partnership grows.

Koide: I can see that a lot of new things have emerged as means of conveying messages.

Iwamoto: The times have changed. Formerly, we in the chemical industry, too, used to worry only about how to satisfy the national standards. Our biggest concern on this front was to meet the standards imposed by the government. But now, companies have begun to make efforts of voluntary control. They are identifying hazards and risks in their business themselves, and working to reduce them in accordance with their own priorities. Companies, too, have to think and act themselves, and announce the results to the community.

It can be seen in the environmental reports issued by companies that the early ones tended to use indicators. They could say the indicator decreased from 100 to 50, for example, but omitted figures for actual levels. Lately, however, the reports have begun to present actual figures. For example, they might state: "Whereas we used to release 100 tons of chemical substance A into the atmosphere, the emission level has come down by so many tons over the last two years." I guess this change, too, is in line with the larger trend of the times as regards values, proactive approaches, and thinking and acting on your own initiative.

Koide: I sometimes think that, even if all kinds of groups are formed, problems aren't going to be resolved without an increase in the number of people who make their own decisions. This holds not only for endocrine disrupters but also for all kinds of other problems facing us today. In a great many cases, there is a certain choice involved. With endocrine disrupters as well, we have a choice between tolerating them because of the convenience of the chemical substances they come from or taking rigorous action to eliminate them. There are a lot of different cases and also a big gray zone where it is by no means clear what we should do.

When all is said and done, we have to pursue discussion in various forms and start making decisions. This task is not confined to Japan; in Europe, for example, there is an approach called a consensus community. Citizens or ordinary adults get together for an in-depth talk about a certain problem.

It is not like in Japan, where experts more or less do all the talking and people merely listen. Naturally, experts are on the scene, but more to provide advice when requested. In short, it is the citizens who lead the discussion. As the discussion goes on, a question may surface, and they then turn to the expert for advice, to get a specialized view. This process gradually builds a consensus to enable selection of options on all kinds of problems in the community, and is taking root in many different places. As I see it, this may be the kind of arrangement at which risk communication is ultimately aimed.

A wide range of tools have been developed, and venues such as this symposium are timely occasions for thought about endocrine disrupters. We have also come to understand more about the facts. Progress from now on will essentially depend on the receiving end - the existence of independent-minded citizens. Communication should rapidly improve with a little change in the shape of Japanese culture.

Although we got under way a little late and do not have much time left, before finishing, I would like to ask each of you to make some final comments. They can be on points which weren't raised here, points you want to re-emphasize, or points that would get you into trouble with your organization if you didn't raise them.

Iguchi: Environmental education came up. The attempts the teacher made to help children learn how to make their own judgments give a big boost to us as well. By the same token, I must say that, although the comments today centered around human beings, those of us doing basic research in this field realize that people are not the only ones inhabiting the environment. We have to constantly bear in mind an environment that is habitable not only by humans but also wildlife. For this reason

as well, discussions will be nothing more than empty talk unless we get into closer contact with the actual environment around us from an early age - handling plants and animals, even if we end up killing them at times. The question of what to do about chemical substances invisible to the eye is important, to be sure, but I would like to get our children a little closer to nature.

Iwamoto: At the outset, Mr. Koide mentioned traffic accidents by way of analogy, but I still think the ordinary consumer does not have a good understanding of the problem posed by chemical substances. I believe this lack of understanding translates into greater fear about the risks.

In the final analysis, even as one in the industry, I think it is crucial to prepare a venue for free discussion on such problems by ordinary citizens, academics, and people in the business. Our outlook has changed a lot, and our current stance is to provide as much information as possible.

Through this discussion, we could all aspire to a better future. This is why I consider it vital to prepare and make full use of such venues for discussion among citizenry, industry, and academia.

Sakita: I happen to be constructing a local network in the community where I live. This is an autonomous network for creating a pleasant community that takes account of the environment and links citizens, companies, and the administrative authorities. When you are in routine contact with companies encountered through such a network, it produces an atmosphere that makes it easier to freely ask them questions about chemical substances and other topics that come up.

While citizens, too, have to learn more about the subject themselves, I would definitely like to see companies take part in community gatherings or volunteer groups together with the citizens on a routine basis. By so doing, they should get a better grasp of the feelings and fears of the citizens. This kind of climate should facilitate the formation of firm bonds of trust.

Another thing - I wish there were more people who could serve as links in the community. I am registered with the Ministry of the Environment as an environmental counselor, and we people registered as such links, for example, should do more research of material on chemical substances. Conversely, people who have a good knowledge of scientific end should receive training to function as links between the consumers and all kinds of (specialized) information. I hope there will be some movement toward such interaction and the cultivation of such personnel.

Endo: The symposium was very instructive for me. I think that the important thing for our children is to learn that there are risks tied to the convenience and that they have to decide how much precedence they will give to convenience and make the right decisions to set priorities in their own lives as human beings.

I would like to finish by expressing my desire that schools will be supplied with teaching aids and information that will help children to make issues their own, and systems for provision of information in a form that can be easily absorbed by children on subjects they want to know about. Thank you very much for inviting me today.

Adachi: I realize that we on the administrative side have to do everything in our power to make arrangements for risk communication. You mentioned the four communication elements of facts, timing, manner of conveyance, and the condition of the receiver. As for timing, the first pollutant release and transfer register (PRTR) in Japan is finally being compiled and should be announced in the near future, as the rest of you may already know. In this sense, the time is perfect for heightening interest in chemical substances among the general public. We have to seize this opportunity and make the right preparations for risk communication as well.

One last word: however great the efforts made by the authorities may be, they will all go

for naught if the citizens do not take an interest in the problems as real concerns in their own lives. I think we all, myself included, have to get more involved with and concerned about the issue of chemical substances in our midst.

Koide: Thank you very much.

There is the proverb "ignorance is bliss," but in our real world there are many things that would endanger our lives if we ignore them. I think we are now witnessing a momentous change in values and priorities. In Japan in particular, there has been a clear shift of priorities from economic prosperity to peace of mind and security. The most important provisions for peace of mind and security are arrangements for the welfare problem including medical and nursing care, and the problems of environment and education. These three areas are going to carry a lot of weight in this age.

It is consequently also an age in which people have to chart their own courses instead of following those set out for them by someone else, and be movers and shakers themselves. As such, to make their own decisions, they will have to gather information in their roles as consumers, taxpayers, and ordinary citizens.

In a nutshell, the aim in risk communication lies in deciding what path to take for the next age, that is, the future - to make the right decisions.

While we didn't have much time, many issues were brought up and I believe we got at least the basic outlines of the problem. I believe that, short as it was, this symposium will be fruitful if it motivates all of you to consider these outlines from your respective standpoints and do your best to expand on them, by even a small degree.

In ending this symposium, I want to thank our panelists for their comments and all of you in the audience for your kind attention.