INTERVIEW: DR. AKIRA TOKUHIRO

Fukushima, Science, and Radiation

Dr. Akira Tokuhiro is a professor of mechanical and nuclear engineering at the University of Idaho. He was interviewed at the American Nuclear Society, Washington, D.C. meeting, Nov. 21, 2011, by Marjorie Mazel Hecht.

Tokuhiro, along with Wade Allison, a professor emeritus of physics at Oxford University, visited Japan in September 2011, to hold public forums and meetings on radiation and reason, as opposed to the scare stories. They were joined by David Wagner, a Tokyo-based risk communication specialist. Tokuhiro and Allison visited Fukushima to learn, and to discuss post-accident contamination with local residents.

The three are pursuing the question of changing the international standards of radiation protection, which are now arbitrarily low, based on the false Linear No-Threshold (LNT) thesis that all radiation is dangerous.

21st Century: What inspired you to go to Japan, to promote "radiation and reason"?

Tokuhiro: Being Tokyo-born and in the nuclear profession, I wanted to contribute to the recovery effort and crisis management effort. I just felt that I needed to do something to help.

Originally I had an idea in mind—sounds a little bit negative—but I wanted to have an international conference in Fukushima called "the plight conference." That was to really bring attention to the victims and the evacuees. Not the nuclear accident, because that just got too big.

It's been hard to organize that, but maybe next year.

That's how it started, through discussions on nuclear safety, questions of what's the most recent news, keeping track of the technical side.

21st Century: That was a big job.

Tokuhiro: Yes, that was my "hook." So we realized at some point that putting on a conference is not so easy. The novel thing about the conference is that we were going to get about 500 journalists to come to Japan, and invite only evacuees and victims to the conference to bring out the human side of the story. We didn't want any anti-nuclear people, we didn't want nuclear vendors, we didn't want utilities. But we had to whittle it down to just "radiation and reason."

Radiation and Reason is the title of Wade Allison's book. He wrote that well before Fukushima, and it happened to be translated into Japanese. There was a very motivated woman who convinced a publisher in Japan to translate it.

So that came out in Japanese, and the timing was just right.

21st Century: Just after Fukushima?

Tokuhiro: Yes, in the July-August timeframe.

It was Wade Allison's first time in Japan. We met for the first time at Narita Airport. And we went right to Fukushima. And through his contacts there were a couple of high school teachers, some hospital doctors and administrators who were our hosts. One of them picked us up and took us around.

We went to Minami-Soma, one of the hospitals. They said they were operating at about 40 percent capacity. Some of the doctors had left because of the scare over radiation, and some of the patients were evacuated and had not come back.

21st Century: That's terrible—the patients would probably have been helped by a little low-level background radiation.

Photos courtesy of Akira Tokuhiro

From right: Akira Tokuhiro and Prof. Wade Allison with two Minami-Soma Hospital hosts, on a coastal road bridge near Namie village, about 3-4 km north of the Fukushima Dai-ichi plant, Oct. 1, 2010. The ocean is about 1 km on the left. Note the mound of debris in the background at right.

Three dosimeter readings at the coastal road bridge, showing 0.58, 0.40, and 0.529 millisieverts/hour.

Tokuhiro: Yes—this thing about the linear no threshold theory, LNT: There's no scientific basis for damage at low levels. So, for the cleanup, the number of becquerels per kilogram of soil that is their clean-up goal, makes a critical difference in how much they'll have to spend on the cleanup, trying to get it to a low level, say, 500 becquerels per kilogram of soil. There's a Health Ministry report that says they want to reduce the final kilobecquerels of radiation per gram of beef down to 100. It's just unbelievable.

21st Century: It doesn't make sense. But people are so brainwashed. That's the word you have to use, because they just don't understand what it is.

Tokuhiro: Wade Allison had a specific message on this. He really would like to encourage the ICRP—International Commission on Radiation Protection—to reconsider the prescriptive levels that they have.

21st Century: How does Dr. Allison intend to go about changing the ICRP?

Tokuhiro: Right now, I think he's just bringing up the discussion, a first step. And if you look at his book, he shows that in 1951, the ICRP's original prescriptive levels were much higher, and the ICRP kept just lowering and lowering them.

21st Century: Based on fear, really, not any change in the science.

Tokuhiro: I guess my analogy is—I'm much more of a big picture person. It's really Wade Allison's expertise—if you make the safety argument, say for highways, then we need to have the speed limit go down to zero for automobiles, because it's safer.

So I would say that risk is a spectrum. And when you talk about risk, you can't just talk about radiation. You have to talk about all kinds of risks, including external or internal exposure, chemicals, smoke, hormones, and so forth

If you're eating sushi, for instance, you know that the tuna has mercury content. It's mercury laden, so there's risk in that. In Japan, you eat the puffer fish for the delicacy of the poison. And there are *E. coli* outbreaks all over the world.

The other thing I want to stress is that there's a concept called resiliency, and that's what I said in the presentations I made in Japan. The body has an ability to accommodate to toxins that are ingested.

21st Century: It may even strengthen the body's immune system functioning.

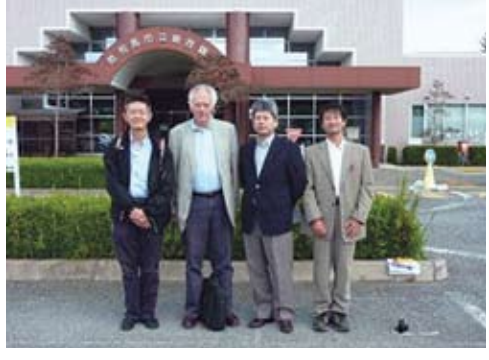
Tokuhiro: Exactly. So there is a human resiliency in terms of ingesting radioactive particulates—cesium-137 or others. And I can tell you what science doesn't know today: Science does know that resiliency is different in every individual human being, **but** cannot predict the resiliency in each individual. We don't have enough scientific knowledge to predict the resiliency of the human body against ingesting toxins.

21st Century: You know, Dr. Edward Calabrese looked at thousands of studies on all kinds of toxins, including radiation, and he finds the same spectrum of results, a "J" curve, so that on all of them there is a beneficial effect up to a certain dose level. Above that, there isn't.

And it doesn't matter what the substance is, he says. He's found that the curve in different kinds of things is the same. He says it's very clear; there are so many experiments that show it that it's really unassailable. Exactly what the mechanism is, is another question.

Tokuhiro: That's why I'm trying to use

Tokuhiro and Allison at Minami-Soma Hospital, talking with senior doctors who monitored the radiation exposure of evacuees.



Tokuhiro and Allison posing with a hospital host and a Soma High School science teacher host, in front of Minami-Soma Hospital, which is 25 km north of the Fukushima nuclear plant.

Professors Tokuhiro (left) and Allison addressing a Tokyo meeting, sponsored by the American Chamber of Commerce in Japan, on food safety, Oct. 3, 2010. An outline of the presentations can be found here. Videos of the meeting are here.

a little bit of street sense. When you have these international entities and there's a consensus, that consensus view sometimes is a social activity. People agree because they're part of the party. There's a sense of membership and they don't want to go against the legacy of their organization.

21st Century: That's very apparent with the Linear No-Threshold.

Tokuhiro: It becomes detached from the science. They are not willing to look at the science, because everybody in this membership has agreed to maintain the *status quo.*

21st Century: And new people coming in to the profession, learn that "this is how it's done." So it never changes.

Tokuhiro: Right. So there's a threshold level, and there is no scientific basis for saying there is not. And we are abandoning our principles as scientists not to say we really need to look at this again. And we need to look at it in the broader context of toxins that we ingest and that we're exposed to.

21st Century: How would you get the American Nuclear Society, for example, to begin to look at this?

Tokuhiro: Well, I'll take that up at a talk this week, that we need to look at that, that we need to reconsider.

21st Century: I didn't find a single negative response from anybody I've talked to at the conference today on the LNT question. Most people knew about it. They didn't know that Herman Muller, the Nobelist was a eugenicist, or some of the other nasty background....

I was really surprised. Muller was a protégé of Huxley, who was a vicious green and eugenicist of the hard-line Nazi type. As far as I can tell, Muller was not that, but Huxley invited him to come to his institute in the early 1900s, so they must have shared some kind of ideology.

Then Muller went to Germany to study, and he left in the 1930s because of the Nazis and went to the Soviet Union. He wrote a book on eugenics in 1935, and when Stalin read the book in Russian translation, he told Muller to get out of the Soviet Union.

I think there's a big story there—I don't know what it is yet. So then he went to England and later returned to the United States.

But people change over their lifetime.... Muller was very active with Bertrand Russell in the "Ban the Bomb" movement, and Russell was a big genocidalist. He wanted to kill off millions of people periodically, and he said how to do it. He made no bones about that. I couldn't quite believe this in the 1970s when I first heard it, but the quotes from him are there, in black and white.

Russell said, we don't want to go out and just kill people, but disease, wars, famine, and sometimes other methods would be necessary. He was targetting people of color in particular, but also people in general. Russell was not a nice, happy person.

Dr. Calabrese thinks that Muller just wanted to protect the human genome from radiation. I'm not sure; I think that there might be more to it.... He's gone into the archives at the Atomic Energy Commission and others looking for correspondence and reading some of the papers. Muller wrote a lot.... I think it's important to look at the history of this.

Tokuhiro: It has the makings of a movie. It's really pretty fascinating. It brings a dark history of humankind into view.

21st Century: And the continuation of it, the people who are still defending the LNT, on what basis are they doing it?

Tokuhiro: That's why it's a social activity, not so much a science activity.

21st Century: Well, it's one of the bad social activities that have to be turned around! Do you have specific proposals

Debris alongside a coastal road near Namie village. Their hosts took Tokuhiro and Allison on a tour of the area via ambulance.

More scenes of tsunami destruction near the same coastal road. "It's a beautiful area—hills, mountains, and a lot of trees. Very different from Tokyo," Tokuhiro said.

that you want the ICRP to discuss.

Tokuhiro: I agree with Allison, that we have to get away from the idea of "as low as reasonably achievable"—ALARA. He proposed "as low as safety allows."

Allison's view, and I agree, is to set an upper limit, and that would be *half* the actual radiation threshold beyond which you would actually start to see evidence of harm.

21st Century: So he wouldn't go to the actual threshold, but halfway?

Tokuhiro: Yes, he was saying, if the current standard is 20 millisieverts per year, and the threshold is actually 200 millisieverts per year, let's make it 100 millisieverts per year. Beyond that higher level, you may start to see some documented medical evidence that there is a health effect.

But even then—I was discussing with a health physics professor today, asking what is really the definition of health effects? What if, because of ingesting cesium-137, for example, what if it disturbs your sleep pattern? Is that a health effect? You get into gray areas in terms of what is a health effect that you can attribute to radiation.

21st Century: Does cesium-137 actually disturb sleep patterns?

Tokuhiro: I was just using it as an example. With some toxins, that can be. But if you have indigestion, that can disturb your sleep pattern as well. I'm not trying to be humorous, but that's actually from ingesting rich food, or too much food, which can be an health effect; there is a gray area. So, as a scientist, we would say that we need to look at this scientifically.

21st Century: But you also have to look at the enormous benefits that we are missing out on. The Japanese studies, for example, that gave whole-body, low-level radiation to people with lymphoma; those patients are still alive today, as opposed to the patients who didn't get that low dose, before they had the targetted high-dose radiation. So, why wouldn't we be doing that for everybody? If people understood that radiation is good for you at that low level, we would be.

Tokuhiro: Professor Allison has said that because of a set of circumstances—the Cold War, the fear of nuclear warfare, fallout, nuclear winter—all of these things created a generation of people, and now we're sustaining that fear of radiation.

21st Century: I would add the genocidal factor. Population control.

Tokuhiro: That's kind of a coincidental thing. The headlines are that we've now reached 7 billion population.

21st Century: That doesn't worry me, because you look at human beings in terms of their minds, and what they're capable of doing. So the more you have of them, and the more educated they are, the more innovation you have, and the more you can move society forward. . . .

I wish the ANS would begin to promote nuclear really fully. I don't think it does now, because—this morning's session, for example, they were talking about cost-benefit on the lowest possible level. And really, you can't do that with nuclear, because the benefit you get from the high energy flux density, is not measured in cost-benefit.

Tokuhiro: I know. I thought of some different things. A couple of the speakers today talked about nuclear energy and energy as a national security issue, quite a few times. When you talk about national security, and when you, for example, talk about going to Afghanistan or Iraq, you don't do that. We're not talking about cost-benefit there. So, if energy security is a national security issue, then you cannot bring cost-benefit analysis or dollar arguments into it.

21st Century: Yes, it's stupid. It's stupid with health care also. If you have a healthy population, then you get more brain power, more ideas, you can move forward. In this country, you probably have lived here long enough to know the

difference that has occurred, that we've been going backwards not forward in so many ways.

Tokuhiro: I was telling a friend who was sitting next to me, when your child is ill, and in the hospital, you don't do a cost-benefit analysis, you think about that later, about managing how to pay for that surgery.

21st Century: So many things are like that. You have to have a top-down view, look at the overall picture from the world perspective, where resources go, and what they should be used for.

I think a lot of this was to stop civilian nuclear power, because you can show that with nuclear power, you can support an increased population at a better living standard. We proved that years ago, with a study that showed, without any dispute, that the economic benefits to the whole society would be great. China knows that, India knows that. That's why they are going nuclear.

Tokuhiro: We started that, actually. President Eisenhower gave that Atoms for Peace speech in 1953, and many say, set the civilian nuclear energy in motion.

21st Century: And for a good reason! I think a certain faction has always been opposed to that idea. With many others, it's the social factor. They grew up with this, they're continuing to perpetuate it. But behind it is the ideological battle. There has been terrific opposition to giving the developing sector civilian nuclear power.

Tokuhiro: Right, so at this point, we're saying let's put this on the table, let's discuss it again.

21st Century: That's great.

Tokuhiro: So, along with this, what really is a "health effect" of radiation, and what is not a health effect? I think you have to agree on some of these things—positive benefits and negative effects.

21st Century: Edward Calabrese has written many articles on this… on the history, and the medical profession.

Tokuhiro: This is great. I have to look at that. I'm thankful that you brought it up. These are interesting topics. I'd love to read those kinds of papers.

21st Century: And you have students who could do some research.

Tokuhiro: Yes, these are some of the more interesting things. As an engineering professor, I mostly deal with the more nuts-and-bolts stuff. And I have the luxury of most of the time staying away from these issues that are "softer." We call them softer as engineers—but this is actually the biggest challenge when people get entrenched in a position, and it's hard to change that, when it doesn't have the proper scientific basis.

It's an issue that we face with many, many things. Climate change for example. You have science people making science.

21st Century: One of the issues I have with Professor Allison in his book, is that he premised the nuclear issue on global warming. And I think that's silly, because that's research that I've done myself, in terms of how global warming got started. In 1975, there was a meeting with Margaret Mead, a conference. All of the major global warmers were there, and they discussed on the basis of population control, how can we scare people into cutting back on their living standard.

They had tried global cooling, and it didn't catch on, and so they discussed this, and you can read some of the speeches, which were published, where Mead was actually coming out for inventing, just jimmying things so that you could scare people. And that's what happened. The people at this conference included Stephen Schneider, some of the other bigwigs.

Some of them are rabid—They were quoting Paul Ehrlich, who had written *The Population Bomb* a few years earlier. They were quoting Ehrlich, saying yes, we have to figure out ways to curb population. Americans are too consumerist, we have to cut back. This is 1975, and it took off from there. And like the LNT, they surround it with "science," but is it true? I don't think so.

Tokuhiro: Well, it's the reality of humanity that even science is a human activity, and people who have the ability—not necessarily to see the future—but they are smart enough to make a change that will have an impact on the future. So you see that in radiation, and as you said, you see it in climate change.

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- Zbigniew Jaworowski, "A Realistic Assessment of Chernobyl's Health Effects," Spring 1998
- Jim Muckerheide and Ted Rockwell, "The Hazards of U.S. Policy on Low-level Radiation," Fall 1997

Radiation experts argue that current U.S. policy of a "linear no-threshold" approach to radiation damage has no science behind it and is wasting billions of government dollars in clean-up that could be spent on real health benefits.

- Sadao Hattori (interview), "Using Low-dose Radiation for Cancer Suppression and Revitalization," Summer 1997
- T.D. Luckey, "The Evidence for Radiation Hormesis," Fall 1996
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