Professor Wade Allison Interview

CCCJ: Is the amount of radiation that has been released from the Fukushima nuclear accident a threat to human health? How about children?

Professor Allison: I think not. The number of people who are going to die, in my best calculations, from Acute Radiation Syndrome would have already died. The biggest dose that anyone has received is a tenth of what was fatal at Chernobyl. The cancer risk in 50 years if you look at the band of dose of the people from Hiroshima and Nagasaki (in presentation) that overlaps with the most irradiated workers, 1 in 150 of those is likely to die of cancer in the next 50 years or so, but there were only 30 people that received this level at Fukushima, so it is likely 1 or less. Child thyroid cancer is a special case and this was very bad at Chernobyl and there were 6,000 cases, but thyroid cancer is curable and only 15 of those have died. There will be a few more, but we have already had 25 years so it's not going to be that many more. There was no evidence for extra thyroid cancer in adults. The real problem at Chernobyl is that they had an iodine deficient diet. In Japan they don't have this problem because they eat seaweed. And also in many cases iodine tablets were distributed, but that depends on district to district.

CCCJ: With examples of contaminated food reaching consumers, should the people of Japan refrain from consuming food products from Fukushima? Children?

Professor Allison: As stated in my presentation, I have calculated what dose in millisieverts 500 Becquerel's/kg of beef gives you and I was glad to find that I came up with exactly the same number as the government which is 0.008 millisieverts for each kg of meat eaten. If you have a CT scan this gives you 15 millisieverts. This means you can eat 2,000 kg of beef at the so called danger-level (500Bq/kg) in 4 months to receive the same dose as in a CT scan. This 500Bq/kg level is unreasonable. Nobody has looked back at Chernobyl to check the records. The Norwegians after 6 months raised the intervention level for their reindeer meat up to 6,000Bq/kg at the time, which is 12 times the level here because there wasn't any reason not to and the reindeer herders were suffering financially. (Norwegian article is in presentation) In 2002, the Radiation Protection Authority in Sweden issued a statement of regret in the Stockholm daily newspaper saying 'we got it all wrong', referring to all of the meat that was 'destroyed unnecessarily' in Sweden. The UN Report on February 28th, just a few days before Fukushima noted that the major health consequences of Chernobyl were the psychological effects of people being told that they needed to leave their homes, that they were suffering, that they were ill. If you tell people that they are ill, they get ill. Apart from the thyroid cancer no special risks were found for children. Perhaps this is not surprising; children may be growing but their health and immune system is as good or better than those of adults
UN Report February 28, 2011: http://www.unscear.org/docs/reports/2008/11-80076_Report_2008_Annex_D.pdf

CCCJ: Are internal doses of radiation more or less harmful than external doses?

Professor Allison: They are directly comparable. What is interesting is this: if you have a CT scan, the dose is all external; if you have a PET scan then you get radionuclides injected into your blood and that goes through the entire body through the blood system and is therefore internal. A millisievert is a measure of the energy that is deposited in the body. There is a slight difference as to where the energy ends up and there are differences about *when* the energy is deposited, but these are all added up and taken into account in calculating the dose in millisievert. Internal doses are not necessarily more dangerous than external. They actually may be better as they are often spread out over more time. To go back to the CT scan and the cesium in the beef, the cesium in the beef is spread out over 4 months, which the body is more capable of coping with that than it is with the CT scan where you get all the radiation in a flash when they take the data.

CCCJ: What is the effect of long-term, low-level radiation exposure on the human body?

Professor Allison: Although we can't feel radiation, the cells of our body can and they have evolved repair mechanisms. For example, when you have a course of radiotherapy, you don't just have one treatment, you have treatments over and over again, once a day. The reason for that is that every day the cancer cells receive just a bit more radiation damage than they've got time to repair and the peripheral tissue next door (that needs to survive the therapy) is just able to complete repairs each day. By the time that you've had that 30-40 daily treatments, the cancer tumour is hopefully dead, while surrounding tissue and organs are still alive. This treatment only works because of these repair mechanisms, which act on different time scales, often within a few hours. The result is that provided the radiation is spread out in time, as in low-dose long-term exposure, the radiation damage is repaired. Of course there is always the possibility that a little damage is not repaired and accumulates. Until we are old the immune system controls this. Nevertheless a whole-of-life dose limit is sensible, but its value should be high, like 5,000 millisievert.

CCCJ: How does the Fukushima Nuclear Accident compare to the nuclear bombings of Hiroshima and Nagasaki?

Professor Allison: It is quite difficult to make such a comparison. But I can look at the number of people who received a total dose of more than 100 millisieverts -- this is chosen because it is a threshold of measurable cancer among the survivors of Hiroshima and Nagasaki in the period 1950-2000. How many people at Hiroshima/Nagasaki got more than 100 millisieverts vs. how many at Fukushima received 100 millisieverts -- I can do that calculation reasonably well. I don't know at Hiroshima and Nagasaki what the doses were of the people who were burnt, or x-rayed to death in the initial explosions, there are no records of that, so you have to leave those out of it. The doses are known on an individual basis for 86,611 survivors. Out of this number 18,174 got more than 100 millisieverts, but only 30 people have received doses greater than 100 millisieverts at Fukushima. But this is only 86,611, whereas the population of Hiroshima and Nagasaki was 429,000, so when I

factor that in, it suggests that Hiroshima and Nagasaki was 3,000 times the effect of Fukushima. This is just one way of making a comparison. It ignores the fact that many at Hiroshima and Nagasaki received far greater doses.

CCCJ: There have been maps released by the Japanese government illustrating the fallout of radioactive material, which spreads far beyond the most affected areas of Fukushima. Are children safe to be playing in these areas?

Professor Allison: The problem is that it is so easy to measure radioactive decay. The technology is too good, simply for the sake of the publicity. There should be no concern. Even in the evacuation zone, this is relative to 20 millisieverts per year. To appreciate how low this is, it is equivalent to one or two CT or PET scans a year. A patient who has radiotherapy is likely to get 20,000 millisieverts in a month to parts of their body that recover, and that is close to the level of real risk. The effect of evacuating these people is much more harmful than the radiation at 20 millisievert per year. My estimate is that it ought to be acceptable to get 100 millisieverts per month before evacuating. This is a factor of 200 down on what people accept in radiotherapy. 20 millisieverts per year is the level in the exclusion zone - 1000 times less than what people accept in radiotherapy. I think that now with the cooling of the plants, everyone should be encouraged to return to their homes. A threshold dose for a detectable cancer rate at 100millisievert applies if the dose comes in a flash, as at Hiroshima and Nagasaki. Because of the effect of repair, if the dose is extended over a few days, a month to be conservative, the damage can be repaired.

CCCJ: You cite the studies carried out over 50 years on Hiroshima and Nagasaki atomic bomb survivors and the statistics regarding cancer incidents in these populations are very reassuring. Why do you think the Japanese government hasn't made better use of these statistics in calming fears over the long term health impacts of Fukushima?

Professor Allison: Every country takes its lead from the International Commission on Radiological Protection. It would look very funny for any country to stick way out of line with their recommendations and their recommendations are based on ALARA (As Low As Reasonably Achievable) criteria for radiation, which has nothing to do with safety, but it is more of a reassurance level that applied in the 50s and 60s when people didn't want any radiation in their lives when we were talking about 1,000 nukes and nuclear holocaust, which is a different problem. It is purely psychological. It is not Japan that needs to change, but the International body.

CCCJ: Should we be worried about the Fukushima nuclear disaster?

Professor Allison: Yes we should be worried because we need nuclear power. This is a local accident, not a global one and climate change is a global problem. We should be using nuclear energy for the benefit of the environment with the same responsible way that we do with our own health.

CCCJ: Do you have any other words for people living in Japan, especially parents of young children?

Professor Allison: I'm here because I've got 6 grandchildren and I want them to live in a nuclear world. I see the biggest threat to this is the kind of reaction that's been seen in Japan for the past few months.

CCCJ: Thank you very much for your time Professor.

Professor Wade Allison Bio:

Professor Wade Allison is a Fellow of Keble College and Emeritus Professor of Physics at the University of Oxford where he has studied and taught for over 40 years. His hobby is sailing. "Out there on the ocean far from land survival involves physics, and you are all on your own, like mankind on planet Earth" he tells his children and grandchildren. He was educated at Rugby School and Trinity College, Cambridge where he studied the Natural Sciences and Part III Mathematics. His graduate study at Oxford and his earlier research work was in in experimental Particle Physics. He developed new experimental methods with their theory, and applied these in experiments on quarks at CERN and on neutrinos in the USA. He made special studies on the fields of relativistic charged particles in matter. As a result of initiating some years ago an optional student course on applications of nuclear physics, his interests moved sideways into medical physics, in particular safety, therapy and imaging across the full spectrum: ionising radiation, ultrasound and magnetic resonance. He spent 3 years writing an advanced student text book Fundamental Physics for Probing and Imaging (2006). Alarmed at public ignorance of radiation and the mismatch of safety standards that he found he published an accessible account that speaks to scientist and non-scientist. *Radiation and Reason: The Impact of Science on a Culture of Fear* (2009) has now also been published in Japanese and Kindle with an Epilogue on Fukushima.

For more information about this work
http://www.radiationandreason.com
For more about Wade Allison:
http://www.keble.ox.ac.uk/academics/about/archive/professor-w-w-m-allison