Fukushima Children at Risk of Heart Disease□□福島の子供たちの心臓疾患

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Fukushima Children at Risk of Heart Disease Japanese translation is available (http://peacephilosophy.blogspot.com/2011/09/naon-cancer-illnesses-and-conditions-in.html)

Chris Busby

Introduction by Mark Selden

Japanese Translation by Tanaka Izumi follows the English text

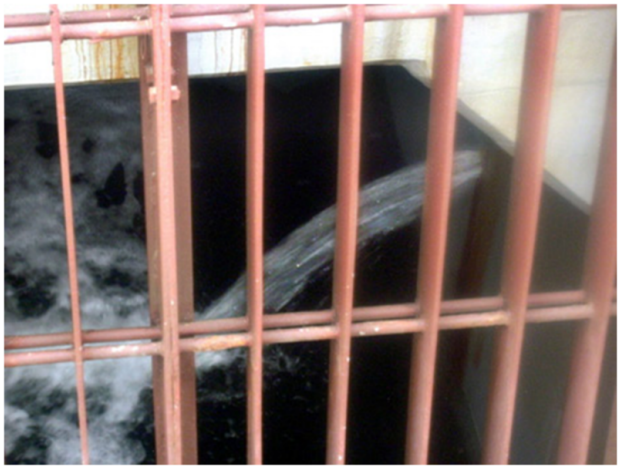
福島の子どもたちの心臓発作について

訳：田中泉

See also the article at Peace Philosophy (http://peacephilosophy.blogspot.com/2011/09/non-cancer-illnesses-and-conditions-in.html)

Introduction

In the six months since the March 11 earthquake tsunami and nuclear power meltdown, a large body of evidence has been produced (and much suppressed) documenting the vast quantities of radiation emitted from the Fukushima Daiichi nuclear power plant as well as other contaminants from ruined factories and farms: into the air, into the water, and into the soil in the vicinity of the incident, throughout Northeast Japan and beyond. For example, on April 11, the Nuclear Safety Commission announced that the Fukushima Daiichi plant, "in the first hours after the accident, was emitting as much as 10,000 terabecquerels of radiation per hour (one terabecquerel = one trillion becquerels)." On September 9, the *Asahi* cited a preliminary report by the Japan Atomic Energy Agency that between March 21 and April 30 the plant emitted more than 15 quadrillion becquerels of radioactivity into the sea. The figure was three times that provided earlier by TEPCO. The report concluded further that 11.4 quadrillion becquerels of iodine-131 and 3.6 quadrillion becquerels of cesium-137 had been leaked into the sea.[1]



Radioactive water leaks into the sea April 2 from a crack in a pit wall near the water intake of the No. 2 reactor at the Fukushima No. 1 nuclear power plant. (TEPCO)

The most serious emissions have been found in the danger zone surrounding the plant, but

radiation does not conform to the logic of concentric circles or evacuation zones decreed by the state. Hot spots are found both within and beyond the state's 20-kilometer evacuation zone. Nor does radiation hew to national borders. It flows with wind and water currents to areas ranging from the Japanese and Chinese seacoasts to the west coast of North America. High levels of radiation have been found not only in humans but in such foods as rice, tea, beef, and fish, as well as in soil, leaves, trees, and cattle fodder.

The Japanese Nuclear and Industrial Safety Agency, which had initially rated the Fukushima meltdown disaster as a level 4 incident on the International Nuclear Event Scale, one month later raised the level to 7, the highest level along with Chernobyl, based on the amount of Iodine-134 and Cesium-137 released.[2]

As in the case of Chernobyl, however, the fiercest debate rages over the *consequences* of the data for the contamination, illness and death of humans, wildlife and nature from multiple radiation and other sources. This is particularly evident in the competing claims concerning cancer deaths caused by radiation. For example, an influential 2005 report by the World Health Association and the International Atomic Energy Association, *Chernobyl's Legacy: Health, Environmental and Socio-Economic Impact,* concluded that the Chernobyl disaster had produced only fifty additional cancer deaths as of 2004. It projected an eventual total of four thousand additional cancer deaths. By contrast, the study edited by Russian and East European scientists, Alexey V. Yablokov, Vassily B. Nesterenko and Alexey V. Nesterenko, *Chernobyl, Consequences of the Catastrophe for People and the Environment* (New York: New York Academy of Sciences, 2009), based on an exhaustive review of thousands of local hospital reports in the most affected areas, documented extensive deaths, injuries and disabilities from multiple factors resulting in high rates of heart disease, brain damage, blood and lymphatic diseases, and birth defects, with infants and children most severely affected. What attracted most international attention and sharp criticism, however, was not their assessment of these dire malignancies, but their projection of approximately 980,000 additional cancer deaths.[3]

Viewed in light of the earthquake tsunami and nuclear power meltdown which has stricken Fukushima and Northeast Japan, however, it is not the debate over projected cancer victims, but the immediate effects on the health of residents, above all children and pregnant women, that should be the focus of immediate discussion: measuring and reducing the risks of radiation and other forms of contamination, moving those at risk out of danger, and treating the injured and wounded.

We have detailed data on the dead and missing from the multiple earthquake tsunami meltdown disaster. Official figures place the numbers at 20,000 dead or missing, 80,000 homes destroyed, 100,000 people evacuated from the twenty kilometer exclusion zone around the Fukushima plant, 400,000 displaced people; 158,000 lost jobs in the three hardest hit prefectures of Iwate, Miyagi and Fukushima, and official recognition that it might be years before areas near the plant could again become habitable.[4] Moreover, the twenty kilometer zone was set by the Japanese government not with an eye to fully insuring the safety of radiation victims, but to avoid the heavy costs of evacuating people in nearby cities such as Fukushima City. With Fukushima rated with Chernobyl as a 7.0 disaster on the international scale (the highest level), it is sobering to recall that a quarter century after the Chernobyl disaster, the large area from which 400,000 people were evacuated remains uninhabitable.

The above-mentioned figures for deaths and

destruction are the product of the earthquake and tsunami. While evacuations and job losses are also the product of the Fukushima plant meltdown, there has been no official data released on deaths and injuries resulting from radiation, with the exception of a small number of workers in the plant. While much attention has focused on cancer risk from both the Chernobyl and Fukushima disasters, there has been little discussion and documentation of the immediate and short-run health effects even beyond official assessments. An important exception to this is Chris Busby's commentary on the impact of radiation on heart disease among children.

Busby in the talk presented below does two things of great importance. First, he conducts a mental exercise, assessing the probable impact of Fukushima-level radiation on the hearts of infants on the basis of information about radiation levels at Fukushima and the literature on the effects of radiation on the heart. Second, drawing on the work of Yu I. Bandazhevsky (link (http://radionucleide.free.fr/Stresseurs/Radioactive_caesium_and_heart_eng.pdf)) and others, he documents the heavy impact of radiation on the hearts of Chernobyl children while noting other immediate effects such as brain damage and birth defects. This data, and other data from Chernobyl, make plain that the health effects of radiation go far beyond cancer.

Bandazhevsky reviews nine clinical, instrumental and laboratory studies of children from infancy to 15 years of age ranging in sample size from 76 to 255 each, in multiple localities affected by Chernobyl. The central finding was "a high frequency of electrocardiographic modifications in all groups as a function of the amount of radioactive cesium in the organism of children. . . In the areas with level of 137 Cs contamination more than 15 Ci/km2 and its concentration in organism more than 80 Bq/kg electrophysiological cardiac modifications appear in the organism of more than 80 % of children." (p. 4) The studies involved control groups, and further laboratory studies were conducted on albino rats which revealed 137Cs –induced diseases of heart, liver, kidneys and lungs (p. 11). Bandazhevsky concluded that radioactive caesium in excess of 30 Bq/kg could lead to serious cardiovascular consequences, especially for children, and was one of the leading causes of cardiovascular diseases among Chernobyl children. (p. 27).

Bandazhevsky notes that Belarus was earlier subject to dangerously high doses of cesium radiation detected in milk and other foods. This was the result of Soviet nuclear testing. Radiation levels fell sharply after 1963, then reached comparable dangerous levels again following Chernobyl. His research documents the high incidence of cardiovascular disease and deaths following the Chernobyl disaster.

Busby's work, drawing in part on Bandazhevsky, highlights the importance of immediately assessing and publicizing the health consequences of the Fukushima meltdown to determine whether further evacuation or other methods are imperative, particularly for infants, children and pregnant women. This should be done for people who were living throughout the twenty kilometer evacuation zone. Equally important, it should be done for people, above all children, who continue to live in hot zones nearby or beyond the evacuation zone.

Mark Selden

Fukushima Children, Radiation, and the Danger of Heart Disease

I'm Chris Busby, I'm a specialist on the health effects of ionizing radiation. And I want to talk to you about Fukushima and Chernobyl. What I want to say is that the models that are used to determine the effects of radiation always concentrate on cancer and leukemia. And so,

the current risk model will say how many cancers are expected after Fukushima and how many cancers are expected after Chernobyl, and so forth. But we know from Chernobyl that radiation causes a whole range of diseases and one of the diseases that it seems to cause is heart disease.

I want to talk to you about heart disease effects on children.

Now, a colleague of mine, Professor Yuri Bandazhevsky, became quite famous, because he studied the cesium 137 exposure of children in the areas that were contaminated by the Chernobyl accident in Belarus. In the late 1990s, he discovered that the children who were contaminated to the extent of having only 20 to 30 becquerels per kilogram of cesium 137, which is not very much, were suffering cardiac arrhythmias, that is, the heart wasn't beating properly, and they were suffering heart attacks and dying. It's a very serious matter.

So it wasn't a question of leukemia and cancer in these children, although that occurred as well, but there were very high rates of heart diseases. So children were manifesting heart diseases, which are normally only found in old people.

And this got me thinking about how this could be at what appears to be low-levels of contamination. So I started looking into this and what I found was truly extraordinary. I shall share it with you.

The heart of a child at the age of about two to five is about this size (see video), and the age of about ten it's about this size, and we know from measurements to be made, how many cells there are in the heart of a child.

A five-year-old has a heart which is approximately 220grams in weight. A lot of it, of course, is blood. So if you take the blood out and leave the muscle tissue, there's about 85 grams of muscle tissue in the heart of a child aged five. This is all data.

Now we actually know also the size of the heart muscle cells, so we know how many heart muscle cells there are in the child's heart. There are about three billion muscle cells. Three billion. And what we can do is we can put 50 becquerels per kilogram of cesium 137 in a thought experiment, we can put this into the heart muscle. A becquerel is one disintegration per second, so we can see how many disintegrations or electron tracks come from the cesium 137 in a period of about a year.

And when we do this, I mean it's really simple it can be done on the back of an envelope, what we find is that there are many more electron tracks traversing the cells than you can imagine. And in fact it works out that if only one percent of those cells were killed by the electron tracks of that level of cesium 137, if only one percent were killed, you would lose 25% of all the muscle cells in the heart.

And this is very serious because the heart is an extraordinary organ, the muscle cells in the heart are autonomous, they just contract and contract for the whole period of life of the individual. And every day they pump seven thousand liters of blood through the body. Truly extraordinary.

And we live for seventy years so this heart beats away continuously for the whole of your life span. But of course these cells are non-replaceable by and large.

It turns out that only 1% of these cells can be replaced in a year. So if these cells get damaged, or if a particular number of these cells gets damaged, they cannot be replaced in a short period of time. So a year's exposure to 50 becquerels per kilogram of cesium 137, and incidentally cesium 137, we know from experiments, binds to muscle so this is where it goes, just as iodine goes into the thyroid gland, strontium goes into the bones and goes to the DNA, cesium 137 goes to muscle. It will concentrate in the muscle tissue of a heart.

So this child's heart, after one year of exposure to that level of cesium, which is quite a low level, will have approximately 25% of its cells destroyed. Now, we would therefore expect to find effects, the same effects that were found by Bandazhevsky. And it does seem, from what

people have been telling me about, in Fukushima, the affected area, that they are actually suffering heart attacks.
So, there are two things that follow from this, which are terribly important.
The first thing is that children in that area should immediately be scanned using ECG, electrocardiograms. All hospitals have this device, so see that they have this. Because the first manifestations of this damage to the heart muscle cells would be conduction problems which can be shown on these ECGs, in fact this is how Bandazhevsky found this. Incidentally, when he reported it, he was sent to jail.
The government wouldn't believe it and accused him of scare mongering. So they sent him to jail. He was in jail for several years until eventually Amnesty International and the European Parliament issued him with an international passport, one of only twenty-five that have been issued, and got him out of jail. (Link (http://www.amnesty.org.au/news/comments/2406/))

I worked quite closely with Bandazhevsky, who was a hero. He received the Edward P. Radford Memorial Prize for Radiation Biology at the Lesvos Conference where he gave the paper that showed these increases in heart diseases in the children.

So the first thing that has to be done is that the children have to be checked out for conduction problems with the ECG. They must be evacuated. And if any of them are suffering from these problems they must be immediately evacuated. But if any are suffering from these problems, ALL children should be evacuated. Because this means that there will be sub-clinical effects from the cesium 137 in heart muscle. And it will not be repaired. The heart cannot be repaired. Heart tissues cannot be repaired so these children will suffer for their entire life and they will die young. This brings me to the second point.
The second point is this; if you die from heart attack or from heart disease, you will not die from cancer, because cancer is essentially a disease of old people, so you get genetic damage and it goes on and on and eventually you get cancer. By and large what happens is that cancer rates go up very sharply as you get old.
But I can tell you that the heart disease effects go up very much more quickly, so what you will find in areas like Fukushima that are contaminated by these radionuclides is not necessarily enormous increase in cancer. There will be an increase in cancer, but you will find a big increase in heart disease.

When we look at Belarus, we find increase in cancer, but we find a big increase in heart disease, an enormous increase in heart disease. And as a result of this, the population of the Republic of Belarus has fallen sharply after the Chernobyl accident, and has now gone into negative replacement. So, in fact, if it goes on like this, the population of Belarus will disappear. And this is what we would expect to see in Fukushima. So I am warning you all now to start looking at heart disease, heart attacks and get children out there quickly.
This is all simple stuff, you can do these calculations, I've done these calculations and I produced a report which will be put on the internet shortly and you can have a look at it. And the European Committee on the Radiation Risk has also released the Bandazhevsky paper that he gave at the Lesvos conference. It is available here (https://docs.google.com/viewer?a=v&pid=explorer&chrome=true&srcid=0Bz1fZmrqFppsNzE4Y2JhMjQtYzc4Yy00MmY3LTkxMmItMzRmY2U3MzhjMTE4&hl=en_US).
Thank you for listening.

The video of the original Busby statement is available here (http://enenews.com/expert-beware-fukushima-radiation-causing-deadly-heart-problems-

children-kids-already-suffering-heart-attacks-locals-affected-areas-video).

See the film Chernobyl Heart documenting heart disease among Chernobyl children (link (http://topdocumentaryfilms.com/chernobyl-heart/)).

See IPPNW report on the health effects of the Chernobyl (http://www.chernobylcongress.org/) nuclear disaster, which discusses heart disease.

Chris Busby, a chemical physicist, is the Scientific Secretary of the European Committee on Radiation Risk (ECRR) and a visiting professor at the University of Ulster (http://en.wikipedia.org/wiki/University_of_Ulster).

Mark Selden is a coordinator of The Asia-Pacific Journal and Senior Research Associate, East Asia Program, Cornell University. His books include The Atomic Bomb: Voices from Hiroshima and Nagasaki *(with Kyoko Selden), and* Living With the Bomb: American and Japanese Cultural Conflicts in the Nuclear Age *(with Laura Hein). His home page is http://markselden.info/*

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Notes

[1] Takashi Sugimoto (http://ajw.asahi.com/article/0311disaster/fukushima/AJ201109099808), "Radioactive sea pollution from Fukushima may dwarf previous estimates," *Asahi Shimbun*, September 9, 2011.

[2] Keith Bradsher, Hiroko Tabuchi and Andrew Pollack (http://www.nytimes.com/2011/04/13/world/asia/13japan.html?pagewanted=all), "Japanese Officials on the Defensive as Nuclear Alert Level Rises,"*New York Times,* April 12, 2011.

[3] Matthew Penney and Mark Selden provide a preliminary review of the debate in "What Price the Fukushima Meltdown? Comparing Chernobyl and Fukushima," (https://apjjf.org/-Mark-Selden/3535) *The Asia-Pacific Journal,* Vol 9, Issue 21, No 3, May 23, 2011. (https://apjjf.org/-Mark-Selden/3535)

[4] Justin McCurry (http://www.guardian.co.uk/world/2011/sep/11/fukushima-six-months-on), "Fukushima six months on: Japanese mark moment earthquake struck, *The Guardian,* September 11, 2011.

The Japanese translation:
福島の子どもたちの心臓発作について

Chris Busby
クリス・バズビー
訳：田中泉
クリス・バズビーです。私は電離放射線の人体への影響に関する専門家です。福島とチェルノブイリについて、お話します。
お伝えしたいのは何かというと、放射線の影響を見定める際に使われるモデルは、いつも癌と白血病にばかり着目します。現在のリスクモデルでは、福島の事故で癌がどれだけ増えるとか、チェルノブイリによる癌はこれだけだとか、そういう話になります。でも我々はチェルノブイリの経験から、放射線はありとあらゆる病気を引き起こすことを知っています。その一つと見られるのが心臓病です。
ここでは、子どもたちへの心臓病の影響についてお話したいと思います。
私の仲間、ユーリ・バンダシェフスキー教授は、チェルノブイリ事故によって汚染された地域に住むベラルーシの子どもたちにセシウム１３７の被ばくがもたらした影響を研究し、かなり有名になりました。
バンダシェフスキーは、1kg当たりわずか20−30ベクレルという微量のセシウム137に被ばくした子どもたちに不整脈がみられることを、1990年

代後半に発見しました。また子どもたちは心臓発作を起こし、亡くなっていました。これはとても深刻な問題です。
白血病や癌の話ではありません。白血病や癌もありましたが、これらの子どもたちの間では心臓病になる確率がとても高かったのです。通常なら高齢者にしかみられない心臓病が子どもたちの体に表れていたのです。
私は考えさせられました。一見したところ低レベルの汚染なのに、これはなぜだろうと。調べてみたところ、本当に驚愕の事実が判明しましたのでお伝えします。
２～５歳位の子どもの心臓は、この位の大きさです。１０歳位だとこの位です。また子どもの心臓の中の細胞の数は、計測すれば分かります。５歳児の心臓の重さは約220gです。その大部分はもちろん血液です。そこから血液を抜くと筋肉組織だけになります。5歳児の心臓にはおよそ85□の筋肉組織があります。データとしてはこういうことです。
ところで心筋細胞の大きさに関してもわかっています。だから子どもの心臓には心筋細胞がいくつあるのかもわかります。心筋細胞はおよそ30億個あります。30億個。
それで何ができるかというと、ここで仮に、□kg当たり５０ベクレルのセシウム137が心筋に入るとしてみましょう。
１ベクレルというのは１秒につき１回の放射性崩壊ですから、そのセシウム137から約１年間でどれだけの放射性崩壊があるか、つまりどれだけの電子飛跡が出るかわかります。これは本当に単純で、封筒の裏側でも使って計算できます。やってみると、想像をはるかに超える量の電子飛跡が細胞内を通っていることがわかります。
しかもそのレベルのセシウム137の電子飛跡で心筋細胞のわずか1%が死ぬと、心臓の心筋細胞全体の25%が失われるのです。
心臓は驚異的な働きをする内臓ですので、これは大変深刻です。心筋は自律的に収縮を繰り返しています。人の一生を通じて収縮し続けています。そして一日7000リットルの血液を体中に送り込みます。本当に驚異的です。我々が生きるのは70年間ですね。心臓はその一生を通じてずっと脈打ち続けます。
でももちろん、これらの細胞はほとんど入れ替わりません。一年間でこれらの細胞のうちたった１%しか入れ替わらないのです。これらの細胞のすべて、または一部が損傷されても、ただちには入れ替わりません。
１キロあたり５０ベクレルのセシウム137に被ばくするということはつまり―

ちなみにセシウム137は筋肉に蓄積されることが実験で分かっています*。ヨウ素が甲状腺、ストロンチウムが骨そしてDNAに行くように、セシウム137は筋肉に溜まります*。
*訳注：6月下旬に原子力資料情報室のUstで崎山比早子さんが「原発事故と放射性セシウム」というお話をされました。そのなかに「2003年のベラルーシの論文」のことが出てきました。映ったスライド資料にBandazhevskyの文字が見えましたのでバンダシェフスキーの論文だと思います。セシウムは甲状腺に一番蓄積され、それから心筋、脾臓、腎臓、内分泌系にも蓄積されるということ、そして重量当たり取り込まれる量でみると、子どもは大人の3倍（甲状腺、心臓）となる、と仰っていました。http://cnic-movie.blogspot.com/2011/03/cincnews-20110326.html

心臓の心筋組織に蓄積されます。つまり、そのレベルのセシウムに一年間被ばくさせられると、その子どもの心臓においては、微量にもかかわらず細胞の約２５%が破壊されることになります。したがって、福島でもバンダシェフスキーが発見したのとまったく同じ影響が出ることが予想できます。
実際、私が聞いているところでは、福島の子どもたちの間に心臓発作が起きている様子です。これから導かれる大変重要なことが２点あります。
まず、その地域の子どもたちの心電図を速やかに取り、心臓伝導系に問題がないかをみるべきでしょう。どんな病院にもある設備ですから。
心筋細胞へのダメージが最初に現れるのは、心電図で見てとれる刺激伝導系の問題であり、バンダシェフスキー本人も、この方法で見つけています。ちなみに彼はこれを発表したことによって投獄されました。政府はバンダシェフスキーの言う事を信じようとせず、恐怖を煽っているのだとしたのです。それで、バンダシェフスキーは投獄されました。数年間獄中におり、アムネスティと欧州議会が国際パスポートを発給してくれるまで出獄できませんでした。過去に２５回しか発給されていない国際パスポートの一つです。

訳注：2005年にバンダシェフスキーが釈放されたときのアムネスティの発表はこちらにあります（英文）http://www.amnesty.org.au/news/comments/2406/

私はバンダシェフスキーとずいぶん緊密に仕事をしましたが、英雄でした。子どもの心臓疾患

の増加に関する彼の報告は、□□□□□の）レスボス会議の時に発表されたものです。この会議で、彼は放射線防御のためのラッドフォード記念大賞を受賞しています。
というわけで、まずやらなければならないのは、子どもたちの心電図をとって心臓伝導系に異常がないかどうかをみることです。
– 避難させることですよね。
ええ、心臓伝導系に問題が出ている子がいたらすぐに避難させるべきです。でも、もしそういう子が一人でもいたら、すべての子どもを避難させるべきです。
それは、心筋内のセシウム１３７による潜在的な影響があることを意味しているからです。それは修復できません。心臓は修復できません。心筋組織は修復できませんからから、子どもたちはその後の一生を通じて苦しみ続け、早死にするでしょう。

そこで２番目の重要点が出てきます。それはこういうことです。心臓発作や心臓病で死ぬ人は、癌では死にません。なぜなら癌は基本的に高齢者の病だからです。遺伝子の損傷が起きて、そこから長い期間を経て癌になります。
だいたいの場合、癌の発症率は年齢が上がると共に急増します。でも、それに比べて心臓疾患の影響はずっと早く現れることは間違いありません。だから福島のような放射性元素で汚染されている地域で見られるのは、癌の莫大な増加とは限らないのです。癌は増えるでしょう。しかし心臓病の方はもっと増えるでしょう。
実際ベラルーシを見てみるとそうなっています。癌も増えてはいますが、心臓病の増え方はとにかく甚大です。そしてその結果、ベラルーシ共和国の人口はチェルノブイリ事故後、急激に減り、今ではマイナスに置き換わっています。
ですから、実際このように続いていくとベラルーシからは人が消えるでしょう。そして、福島でも同じことが起きると思います。
ですから皆さん全員に警告します。これから心臓病、心臓発作を注意して見ていて下さい。子どもたちをその地域から速やかに逃がして下さい。
これはすべてとても単純な話です。自分で計算できます。私はこれらの計算をして報告書をまとめました。まもなくネットに上げますのでご覧下さい。
欧州放射線リスク委員会の方でも、レスボス会議でバンダシェフスキーが発表した報告書を公開しています。
欧州放射線リスク委員会のサイトhttp://www.euradcom.org/に載っています。
*訳注：訳者にはそこからでは見つけられませんでした。でもこちらのリンクにもバンダシェフスキーの論文があります。http://radionucleide.free.fr/Stresseurs/Radioactive_caesiu
ご清聴ありがとうございました。