

How Not to be Fooled by Pseudoscientific Misinformation — Facing societal confusion over radioactivity.

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Since the release of radioactive materials from the Fukushima Dai-ichi Nuclear Power Plant, much information on radioactive substances is flying around in various media. At the same time, so-called experts are sending out scientific data or opinions based on such via television, newspapers, and their personal blogs and so on.

Among these, there are those based on valid scientific knowledge, however, there are also those with a tenuous scientific basis or with logical fallacies. Yet, at a glance these appear to be scientific, and one can be fooled if not attentive. We would like to indicate few points so that people will not be deceived by these distorted information.

First, check the source of the scientific data. In the field of science, just releasing the results of experiments or analysis does not mean that they are recognized as scientifically proven. Typically, one would write a scholarly paper and submit it to an academic journal. The submitted paper then will undergo peer review by experts. If there are any unclear statements or scientific mistakes, it will be rejected.

Conversely, if the reviewers decide that it is a valid scientific paper, it will be accepted and published in the academic journal. Only after this, paper gets scientific approval and authoritative assurance. Of course, one cannot say that because something is published in an academic journal it is entirely free of scientific mistakes. However, because it is reviewed from a scientific viewpoint by experts in that discipline, it is evident that there are fewer mistakes than there would be otherwise.

Incidentally, the acceptance rate for prominent journals such as Science and Nature is no greater than a mere 10%. The reviewing process is just that stringent. Therefore, when one comes into contact with scientific information, it is best to look up its source first. If the source is unclear, though it cannot therefore be completely wrong, its credibility should be questioned.

Secondly, try verifying the data yourself. In particular, the data regarding radioactive substances can seem complicated, however, it isn't actually all that hard to understand, and most of it can be calculated with knowledge of junior high school level math. If anything, the important thing here is to check what kind of assumptions the calculations are based on.

For example, the regulation of radioactive substances in food will have a new standard of 100 Bq/kg starting in April, but this assumes that foods with that level of concentration would be eaten continuously for a full year. In a real life, however, it is highly unlikely to eat nothing but contaminated food, and the vast majority of foods fall well below the set standard. In other words, even if one occasionally eats something above the set standard, in reality, there would not be any harm. Thus, verifying the data is important to promote cool-headed judgments.

Thirdly, verify how the data led to the conclusion or opinion. Not to mention the leaps of logic, it is necessary to confirm that logics are not changed around cleverly.

By way of example, something we often see in an argument regarding radioactive substances is data from animal experimentation being applied to humans as is. In actuality, there are cases in which, although negative effects were observed in animal experiments, they were not observed in humans and vice versa. Therefore, results from animal experiments are no more than reference data, and it is not a proof that humans will experience the same negative effects.

In contrast, epidemiological data obviously uses humans as subjects, and if the population is on a large enough scale and accurate statistical methodology is employed, it is extremely reliable. That is to say, if data from animal experiments and epidemiological data contradict each other, generally speaking, one should trust the latter. By unraveling the logic in this way, we are more likely to prevent misguided judgments.

There are many other points to be aware of, however, even by keeping just the above three points in mind, one should be

able to make a composed judgment.