NANOTECHNOLOGY AND PUBLIC HEALTH

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ABSTRACT

Nanotechnology is developing very quickly, and Japan is in many respects leading the world in this convergence of nanoscale engineering techniques. The public health community in Japan must start to think about the public health impacts of nanotechnology over the next 20 years. The respon sibility for the beneˆts and the harms of nanotechnology lies with government, with corporations and the business community, with scientists and specialists in all related ˆelds, and with NPOs and the public. There are very many questions of public health which are not yet being asked about nanotechnology. If nanoparticles are to be used in cosmetics, food production and packaging, how will they react or interact with the human skin and organs? What chemical-toxic eŠects on life might there be from the nanoparticles in car tires and vehicle plastic mouldings when they are disposed of by incineration? Will they pass into the soil and groundwater and enter into the food-chain? It is now an urgent ethical demand, based on the precautionary principle, that Japan join the governments of the world to take an intergovernmental initiative to intervene in the further development, production and marketing of nanotechnological products with precautionary research and regulation.

KEYWORDS : Nanotechnology, nanoparticles, public health, precautionary principle, risk, global governance

Nanotechnology

It is critical to take public health into account while examining the advancement of nanotechnology.The field of nanotechnology is expanding rapidly, and When it comes to the convergence of many technologies requiring engineering at the 1 nm–100 nm scale (about the size of tiny bacteria and viruses), Japan is in many ways leading the globe. The term "nanotechnology" was first used in 1974 by Taniguchi Norio to describe machining with tolerances smaller than a micrometer, or one millionth of a meter. In 1991, Iijima Sumio of NEC, Tsukuba, made the discovery of carbon nanotubes, which are currently widely used in nanotechnology. Because of how quickly things are developing in North America, Europe, Japan, and East Asia, the question of safety has not been investigated. There are very few research on how nanoparticles and nanodevices affect the environment, wildlife, plants, and the human body have been studied up to this point. There isn't any study like this done in Japan yet, but there are expectations that it will be started shortly. In Japan must now lead the world in all areas, including social, environmental, and health, in addition to technology. We have learnt the lesson of the harm that rapid industrial and technological growth can cause to the environment, ecology, and human health..

WHY IT MATTERS BECAUSE IT IS SO LITTLE

Nanoparticle characteristics and behavior are not merely scaled-down versions of those of microparticles and microdevices. At times, the characteristics and actions exhibit radical differences, surprising variations, and unpredictability. There are quantum effects. Since smaller is more practical, we as responsible scientists and technologists need to reconsider; smaller now carries new, poorly known concerns. Substances undergo changes in their characteristics below 100 nm, including: Increased power ,Varied color,More erratic,More harmful

(70 nm particles pass through the lung's alveolar surfaces, 50 nm via cells, 30 nm through the central nervous system, and the transport of particles smaller than 20 nm is not well understood.)Nanoscale items are highly helpful due to certain unique qualities, yet these properties also come with new concerns. It would be unwise for us to overlook the dangers in favor of the benefits alone.

VARIOUS NANOTECHNOLOGY TYPES

Particles used in burn dressings, medication delivery systems, metabolic system monitoring, in vivo cell tracking, and capsules containing hemoglobin are examples of biomedical nanotechnology.development), quantum dots that attack cancer cells, and bone prosthesis made using nanotechnology.

Nanoparticles may soon be found in food packaging and perhaps in food itself. Sunscreen creams (BASF, L'Oreal), lipsticks and other beauty products, and scents with nanoparticles are examples of current nanotech cosmetics.

Paints, building supplies, tennis rackets and balls, tires, automobile bodywork (Toyota), and plastic interiors of cars are examples of materials that have been nanoengineered.(Renault) to provide long-lasting paper, materials that are deodorant and stain-resistant, and strength and lightness.

Environmental nanotechnology encompasses a range of self-cleaning or toxin-repellent surfaces as well as sensors for testing water.

The development of convergent-nanotech (nanobiotech hybrids) includes the utilization of molecular motors and DNA as nanomaterials. as prototypes for "nano-robots" in biology.

Aspects of health, the environment, and society

Regretfully, advances in nanotechnology are surpassing ethical awareness and safeguards worldwide, and a large number of nanotech items are now available without proper safety testing.

Because of the issues the food, pharmaceutical, and chemical industries have caused, the general people in Japan is growing more worried about the health effects of industrial policies. A single legislative remedy

the 1995 enactment of the Product Liability Law by the Japanese government. In Japan, there have been several incidents of new industrial compounds causing public health issues both before and after the law. Legal action was brought in Japan about the Kanemi PCB-contaminated (polychlorinated-biphenyl) oil sickness in the 1960s, which is arguably the most well-known example. In Japan, PCBs were first used in the 1950s, and they were first produced in 1954. Japan manufactured 59000 tons of PCBs between 1954 and 1972.A occurrence known as the In 1968, the Kanemi Yusho Case took place. In this instance, a large number of people fell prey to the PCB-contaminated rice oil. The Japanese Ministry of International Trade and Industry outlawed the use of PCBs in open system facilities between 1970 and 1972.

These kinds of experiences must teach us. Early warnings were issued in numerous instances, yet inaction enabled the situation to worsen. Of course, new If nanoparticle health catastrophes are to be prevented, chemical compounds and novel industrial processes—including those involving nano-engineering—must undergo extensive testing.

Nanotechnology forces us to reconsider industrial technology's effects on public and environmental health in addition to its technical and scientific components. We currently require an interdisciplinary strategy for managing the risks associated with advancements in nanotechnology on.

CURRENTLY, THERE IS NO SAFETY ASSESSMENT

In 2003, Vicki Colvin, the director of Rice University's Center for Biological and Environmental Nanotechnology in Houston, Texas, stated the following on nanotechnology: In an area where there are more

12,000 citations annually, we were shocked to see that there had never been any toxicity studies specifically focused on synthetic nanoparticles or any earlier study in creating risk assessment models for nanomaterials"'2). The majority of the time, nanotech goods are being produced without any knowledge of their safety or even the methodology for assessing them. The characteristics of a chemical substance vary at the nanoscale, as we have already said, therefore nanoparticle safety evaluation will need to work on different scientific concepts from current particulate evaluation. Furthermore, the precise nanoparticles at what sizes that can cross different cell and tissue barriers remain unclear. American cosmetics already include titanium oxide nanoparticles.revealed that they ranged in size from around 20 to 50 nanometers; as a result, a large number of these would be able to enter cells in the central nervous system and build up in organs3. The majority of the tests that have been conducted involve trials like the three-month direct injection of single-walled carbon tubes into the lungs of rats, making them of little utility. Numerous safety review programs are under underway, and some producers of nanoparticles are coating their particles or using other strategies to reduce any possible harmful effects.

The Environmental Protection Agency in the United States is now conducting a $4 million study project to examine the fate and effects of manmade nanomaterials in the environment.on the health of people. The National Toxicology Program of the National Institute of Environmental Health Sciences (NIEHS) in the United States has also just initiated a $3 million research to investigate the effects of inhaling carbon nanotubes, titanium dioxide, and quantum dots. Similar studies are being conducted throughout the European Union. But there are other possible hazards than nanoparticles. The whole of other dangerous fields is being disregarded, particularly nano-biotechnology, which raises concerns about the compatibility of artificially created particles with the organic nanoscale processes and behaviors of living things.

CERTAIN UNIQUE HAZARDS (RECENT HAZARDOUS ALERTS)

Some recent findings have been recognized by the Canadian environmental non-profit organization ETC as early warnings. (4). This is the list, which presently consists of A few more citations.

It was discovered in 1997 that the titanium dioxide/zinc oxide nanoparticles in sunscreens damage DNA in skin cells by generating free radicals. In 2002, scientists from the US EPA, the Center for Biological and Environmental Nanotechnology (CBEN, Houston, Rice University) revealed that manufactured nanoparticles aggregate in lab animals' organs and are absorbed by cells6). Researchers from NASA/Johnson Space Center stated in March 2003 that rats' lungs contained nanotubes, which caused greater harmful reactions than quartz dust7). The first scientific literature survey on nanoparticle toxicity was published in March 2003 by UK toxicopathologist Vyvyan Howard. The survey found that nanoparticles have multiple routes into the body and across membranes, including the blood brain barrier, and that the smaller the particle, the more likely it is to be toxic. barrier8). The CBEN study, which was published in July 2003 in Nature, demonstrated that fullerene "buckyballs" could pass through soil without any problems and infiltrate the food chain by way of earthworms.

CONCLUSION

Based on the precautionary principle, there is currently an urgent ethical need for Japan to join other governments worldwide in launching an international initiative to interfere in the continued development, manufacturing, and marketing of nanotechnological goods while conducting precautionary research. as well as rule. An intergovernmental panel should be established to regulate nanotechnology in all its forms based on the scientific understanding required to weigh the possible benefits and hazards to mankind. This panel should interact with consumers and non-profit organizations. If mankind is to genuinely benefit from nanotechnology, then prudence and collaboration are essential for its advancement.

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