

Micro materials could pose major health risks

Panel issues warning for products with nanomaterials, saying tiny substances in everything from sunscreen to diesel fuel may be toxic

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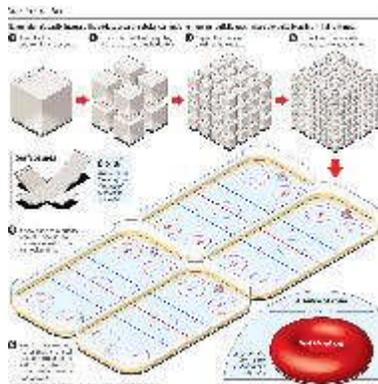
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A blue-ribbon scientific panel has waved a yellow flag in front of a rapidly expanding number of products containing nanomaterials, cautioning that the tiny substances might be able to penetrate cells and interfere with biological processes.

The warning is contained in a report from the Council of Canadian Academies that will be released publicly today. It is one of the most authoritative to date in this country about the risks of engineered nanomaterials, which companies are adding to products ranging from sunscreens to diesel fuels.

The council, which was asked by Health Canada and several other federal agencies to study the state of knowledge about these novel substances and the regulatory changes needed to oversee their use, concluded that "there are inadequate data to inform quantitative risk assessments on current and emerging nanomaterials."

Their small size, the report says, may allow them "to usurp traditional biological protective mechanisms" and, as a result, possibly have "enhanced toxicological effects."



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Although backers of nanomaterials say they hold enormous promise for developing improved medicines and stronger and more durable products, the report cautioned that many useful items once thought to be harmless, such as polychlorinated biphenyls - the now-banned transformer oils known as PCBs - and the herbicide Agent Orange, were later determined to be extremely dangerous.

Nanomaterials are manmade substances measured in nanometres, or lengths of one-millionth of a millimetre. They can be smaller than a flu virus, which typically is 80 to 120 nanometres across.

Over the past decade, they have been increasingly used in such products as cosmetics, wrinkle- and stain-resistant fabrics, sunscreens and sports equipment, including tennis racquets. The full variety of products containing nanomaterials to which Canadians are exposed isn't known. But the number of such items entering Canada from the U.S. alone was estimated to be at least 517, according to an Industry Canada estimate from last year cited in the report.

Some of these offerings should be investigated more closely, says Pekka Sinervo, dean of the University of Toronto's faculty of arts and science, and the chair of the panel.

"One can argue fairly strongly that some of those products probably should be looked at on a going-forward basis," Dr. Sinervo said. "It's a new technology. We are concerned."

Health Canada did not respond yesterday to e-mailed questions about the panel's report.

The council is an independent academic advisory group funded by the federal government, but operating at arms-length from Ottawa. The 16-member panel that wrote the new report included some of Canada's leading scientists and top international experts on nanomaterials.

Scientists have been able to fashion these new substances by assembling them almost atom by atom, creating materials that have properties unlike the larger chunks of the matter from which they're made - much like a diamond and pencil graphite are both composed of carbon but have entirely different properties.

One example is titanium dioxide used in sunscreen. Nanoparticles of the material, engineered to have crystal structure, allow visible light to pass through them, but they also absorb ultraviolet light, making them ideal as the active ingredient in sunscreens. Titanium dioxide in a bulk form has a completely different attribute: It is used as the intense white pigment in paint.

Dr. Sinervo said sunscreens have been used for years without adverse human health impacts, suggesting they are harmless to people while reducing the risks of skin cancer.

But the issue of nanoparticles' overall impact on the environment is still under review. Researchers at Trent University in Peterborough, Ont., for instance, are currently investigating the effects of sunscreens when they get into water, trying to determine if they harm algae, amphibians or fish. They don't expect to complete their research until 2010.

Although there may be risks with nanomaterials, there is research suggesting they could offer major breakthroughs in a variety of fields.

One of the most watched is in medicine. Typical of the research was a report earlier this month in the Proceedings of the National Academy of Sciences that found when nano-sized particles were given with chemotherapy, doses of the anticancer drug could be cut by about 95 per cent, without any reduction in therapeutic effect.

But the new report recommended that, given that the impact of nanomaterials on living things is "poorly understood," regulators err on the side of caution whenever there are reasons to doubt the safety of the new substances. This will give scientists time to better understand what risks, if any, they pose.

"In the view of the panel, an assessment of what is known and not known about the health and environmental risks of engineered nanomaterials is urgently needed in both the Canadian

and international context, given that hundreds of nanoproducts - consumer products employing nanomaterials - are already being marketed internationally," it said.

The report said the federal government doesn't need to craft new laws to deal specifically with nanomaterials, but it warned that loopholes exist in regulations that could allow some of these compounds to escape detailed scrutiny. Some nanomaterials may not be used in large enough quantities to trigger reviews.

Another worry is that these materials may sidestep the existing rules covering the evaluation of new chemicals introduced to the Canadian market. New substances must undergo detailed safety evaluations, but the report said companies can argue that many nanomaterials, by merely rearranging atoms into a new shape, aren't really new things at all and therefore not subject to reviews.

"Current regulatory triggers are not sufficient to identify all nanomaterials entering the market that may require regulatory oversight," the report said.