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Getting to the Bottom of Plastic Bottle Risks

Retailers are demanding vigilance against worrisome chemicals in containers, food, and other goods

By John Carey

As founder and CEO of baby goods retailer Giggle, Ali Wing does her best to ensure that the strollers, toys, and other gear she sells are as safe as possible. From the time of Giggle's launch six years ago, she avoided baby bottles containing the controversial chemical bisphenol A (BPA). But other products she sells still contain BPA and scores of other chemicals, and she doesn't know what's really safe. "We can't guarantee everything is healthy," she says. "We haven't found a way to get the answers."

Wing's worry over the safety of chemicals "is the question of the hour for the early 21st century," says David Rosner, professor of history and public health at Columbia University. The U.S. and other countries are awash in synthetic compounds—the molecular innovations of our industrial society—with trace amounts of a number of them routinely found in our bodies. Yet "we don't understand what this low-level exposure means," Rosner says. That makes it difficult for the public, and even for experts, to interpret mounting evidence of harmful effects of BPA and other substances. In early November fears were further stoked by a new study linking BPA exposure to male sexual dysfunction among workers in Chinese factories.

The lack of answers is not just a public-health issue; it's a business one, too, pitting industry against industry. **In a trend some call "regulation by retailer," companies from Giggle to Staples are responding to customers' concerns by turning up the heat on chemicals and plastics makers, eliminating BPA from products and asking for information on other substances. "This is what happens when effective policies are not implemented," says Roger McFadden, vice-president and senior scientist at Staples (SPLS), who is frustrated**

with a regulatory system that has failed to answer these questions. "I hope this is a wake-up call."

Public worries are also leading states to pass their own laws and regulations in the absence of strong federal oversight, forcing the chemical industry to cope with a patchwork of rules. **The current federal regulatory system probably served those manufacturers' short-term interests by requiring them to do very little to assess safety. But that "has come back to bite them," says Richard Denison, senior scientist at the Environmental Defense Fund.**

Recent flare-ups and public pressure have forced chemical makers to back away from their historical resistance to tougher rules. "There is a lack of confidence in the regulatory structure," acknowledges Cal Dooley, CEO of the American Chemistry Council, the industry's trade group. The ACC is now pushing to strengthen the 1976 Toxic Substances Control Act (TSCA), under which the Environmental Protection Agency has not completely banned a single substance—not even asbestos.

As Congress begins to take up the matter, there's surprising agreement among companies, public-health advocates, and environmentalists on the general outlines of needed reforms. That includes giving the EPA more authority and setting mechanisms to identify and study chemicals deemed most risky. But the details will be thorny, especially because old-style risk-assessment tools aren't good for figuring out dangers from the current low-level exposures.

The poster child for these issues is bisphenol A, which is found in a staggering array of products, from food and beer cans to all kinds of plastics. Made at the rate of 6 billion pounds a year, it acts like the female hormone estrogen and also blocks the male hormone androgen. In animal studies, it has been linked to prostate damage, lower sperm counts, and the possibility of cancer. Such results "raise the question of who's minding the store," says toxicologist Gary Ginsburg at the Connecticut Department of Public Health and co-author of *What's Toxic, What's Not*. "We've known since the 1930s it is hormonally active, yet it shows up in everyone's canned food. Why hasn't the light bulb gone off before, just to make sure it's safe?"

One reason is that the science is complex. When someone ingests BPA with his green beans, it doesn't actually get into the body in its worrisome, estrogen-like form. Instead, as part of a natural mechanism for coping with dangerous substances, the body uses an enzyme in the gut to add a sugar molecule to the chemical. That renders BPA inactive as a hormone and speeds its journey to the urine and out of the body. The BPA that researchers detect in urine—it's found in 93% of people tested—is, in fact, in this inactive form.

This quirk of metabolism is crucial to the debate over BPA's safety. Consider the recent study of Chinese workers. Led by Kaiser Permanente epidemiologist Dr. De-Kun Li, the study found that workers exposed to higher levels of BPA reported increases in erectile dysfunction, as might be expected from BPA's hormonal effects. It is the first evidence of problems from exposure in humans, says Li, and the biological disruptions "could just be the tip of the iceberg."

But the workers got BPA through their skin and lungs, where it is not deactivated, points out Steven Hentges, BPA expert at the ACC. In contrast, the stuff that comes from food, where most of us get it, is inactive and safe in the body, he argues.

So is BPA-fear a false alarm? Maybe not. "We think there is a lot more to the story," says Ginsberg. It turns out that the body uses the sugar-adding mechanism not just to disarm toxins but also to shuttle natural hormones around the body in inactive form. When the hormones get to their destination, another enzyme turns them back on. That can happen to BPA, too. One place it gets reactivated is in the placenta, which could result in harmful effects on developing fetuses.

The Food & Drug Administration is now reviewing such studies as it reevaluates the safety of BPA, with an announcement expected on Nov. 30. But the FDA's action won't settle the controversy. The larger problem is that the old-fashioned way of determining chemical safety—giving animals increasing doses until they get sick—just doesn't work for hormone-mimicking substances like BPA. The science that is being done now regarding, say, how humans metabolize BPA does not lead to easy safety determinations. Worries Rosner: "It will take generations to see the impact."

Complex Chemistry

The chemical industry has fended off repeated efforts to toughen regulations on BPA and other potentially toxic compounds. In some cases, companies have used aggressive tactics that call to mind Big Tobacco. David Case recounts the tale in a January 2009 investigation in *Fast Company* titled "The Real Story Behind Bisphenol A."

For this and other stories, go to http://bx.businessweek.com/chemical-industry/reference/

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