



The Troubling Case of Bisphenol A: At What Point Should Science Prevail?

By Jon Entine

On January 15, 2010, the U.S. Food and Drug Administration (FDA) issued a long-awaited update of its policy regarding bisphenol A (BPA)—an industrial chemical used to add strength and flexibility to many plastic products—finding it safe as currently used. The FDA review was undertaken after intense campaigning by advocacy groups and the media to ban or severely restrict BPA use, which continues even in the wake of the FDA decision. The campaigners' focus has now expanded to include other regulatory bodies, as well as states and localities. If they are successful, they will jeopardize the system for making regulatory decisions based on sound science.

BPA is one of the most ubiquitous chemicals in the world. Plastics made from it have been in use since the early 1950s. Approximately 6 billion pounds are produced globally each year by fifteen different corporations. When used as a building block in plastic, BPA makes it stronger—hard enough to replace steel and transparent enough to substitute for glass. BPA can withstand high heat and has high electrical resistance. It is found in electronics, DVDs, car dashboards, water bottles, eyeglass lenses, and microwavable plastic containers and is a key ingredient in epoxy resins used to make dental applications. At present, viable alternatives for many of its uses—such as in the plastic coating of metal can liners, where it does not affect taste, helps prevent bacterial contamination, and extends shelf life at a relatively low cost—do not exist.¹

BPA is also one of the world's most studied chemicals. In 1982, the National Cancer Institute and the National Toxicology Program (NTP) cleared it as a potential carcinogen,² and a massive review by the Environmental Protection Agency (EPA) endorsed its safety in 1988.³ Twenty years later, the FDA reviewed the studies to date and declared it safe at estimated levels of

human exposure.⁴ Over the past forty years, BPA has undergone more than 4,500 evaluations and counting. It has been declared safe based on peer-reviewed scientific evidence by every major government agency in every major industrial country in the world.

Last summer, after members of the Obama administration's incoming, politically appointed executive team at the FDA assumed their new positions, the agency announced it was reviewing the 2008 decision that had endorsed the safety of BPA—a decision heavily criticized by activists

Key points in this Outlook:

- Regulatory agencies worldwide, drawing on thousands of studies, have concluded that bisphenol A (BPA), a chemical used in many plastic products, does not adversely affect humans.
- Despite these consistent findings, some groups are using unproven theories to claim BPA presents dangers to humans, and they are advocating for restrictions on BPA.
- If policymakers are compelled to abandon scientific standards due to political or media pressure, the checks and balances of the regulatory system will be in jeopardy.

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as an example of the Bush administration's alleged anti-science bias.

BPA has been under constant attack by some environmental advocacy groups and journalists campaigning to ban the chemical outright or restrict its use, particularly in products handled by infants and children. The point organization for much of this criticism is the Washington-based Environmental Working Group (EWG), which has been actively campaigning for a ban since 2007. EWG is most noted for its work in demonizing phthalates, which are relatively innocuous plastic softeners. EWG has not done any original research and does not have any scientists with targeted expertise in chemical additives to plastics. It regularly seeds the Internet with sensational and often-misleading interpretations of serious studies. For example, in November 2009, as the environmental community anxiously awaited the FDA's decision regarding BPA, EWG posted a report on the Huffington Post with the headline, "BPA Wrecks Sex, Fouls Food—and Probably Worse."⁵

The public campaign conducted by EWG and other activist organizations has led to thousands of news reports by mainstream news organizations. The *Milwaukee Sentinel* alone has published no fewer than fifty stories—for which it has won a bushel of journalism awards—excoriating the government for not restricting the use of BPA. It consistently frames the issue using what can only be characterized as scare tactics. In its "Watchdog Report," the *Sentinel* warned that BPA could cause "cancers of the breast, brain and testicles; lowered sperm counts, early puberty and other reproductive system defects; diabetes; attention deficit disorder, asthma and autism"⁶—none of which has been authenticated by scientific studies.

Over the past year, a feedback loop has developed among news organizations, environmental groups, and consumer organizations promoting the view that BPA is unsafe. In its December 2009 issue, *Consumer Reports* repeated unfounded allegations that "BPA has been linked to a wide array of health effects including reproductive abnormalities, heightened risk of breast and prostate cancers, diabetes, and heart disease" in humans. It urged the FDA to revise its "inadequate and out of date" standards.⁷ The report inspired panic-inducing stories at ABC News, the *Los Angeles Times*, Fox News, and the *New York Times*. In a separate commentary, *New York Times* columnist Nicholas Kristoff compared the danger of BPA to dangers he has faced as a reporter, such as "threats from warlords, bandits and tarantulas."⁸ News

accounts rarely noted that no regulatory body in the world had reached conclusions even remotely similar to the scare headlines.

Considering the change in ideological complexion at the FDA, ban proponents were taken aback on January 15, 2010, when the agency upheld its prior finding that BPA is safe. It declared that BPA posed "negligible" or "minimal" concern for most adults and "is not proven to harm children or adults." Although activist groups have charged that the FDA's evaluation protocol is inadequate or outdated, according to the report, "Studies employing standardized toxicity tests used globally for regulatory decision making thus far have supported the safety of current low levels of human exposure to BPA."⁹ When asked directly if adults or children faced any real health dangers, Joshua Sharfstein, M.D., the FDA's principal deputy commissioner, minced no words: "If we thought it was unsafe, we would be taking strong regulatory action."¹⁰

Although the FDA report repeatedly stated that the FDA study had not found any scientific basis to justify restrictions on products containing BPA—even those regularly handled by infants or pregnant women—the report still voiced "some concern," adding, "we need to know more." The FDA said it would continue to fund studies, and it expects results within twenty-four months. (Last fall, the National Institute of Environmental Health Sciences awarded \$30 million in grants, \$14 million of which was funded through the stimulus package, to study BPA.)¹¹ While reaffirming there were no dangers, the FDA report recommended ways to limit exposure to BPA.

If the FDA had taken stronger action, it would have come as a shock to regulators worldwide. In the past few years, BPA has undergone comprehensive reviews by ten other regulatory bodies, including ones in Asia, Australia, New Zealand, and Canada.¹² In what is considered the most comprehensive and definitive review ever, a 2006 European Union (EU) review certified that BPA is safe.¹³ This is particularly striking because the EU evaluates chemicals using the "precautionary principle," a controversial notion that environmental policy should be based on the suspected risk of causing harm rather than on evidence that a substance actually causes harm. Even under such broad standards, the EU has consistently found that BPA is safe for use in products handled by adults and infants. (For a list of regulatory BPA studies, surveys, and reviews, see www.aei.org/outlook/100946.)

What is the back story here? How does it happen that a substance consistently deemed safe by reviewing bodies and scientific studies remains in the cross hairs of

campaigning journalists and environmentalists? What does this controversy suggest about how scientific decisions are made in a highly charged political environment?

The Low-Dose Hypothesis

Researchers generally agree BPA is neither mutagenic nor likely to be a carcinogen.¹⁴ They disagree, however, about whether the chemical presents danger to children or infants. The controversy over BPA rests with the way science evaluates risk in chemicals. Activists cite a small but growing body of laboratory research using a novel theory that suggests that low doses of chemical exposure might have more impact than high doses. These studies—many of which have not been replicated—suggest that BPA may cause metabolic disorders in rodents.¹⁵ On the basis of these concerns, and invoking the precautionary principle, some scientists have urged that the use of BPA be curtailed.

The notion that lower levels of exposure may cause problems while higher doses do not is referred to as the new paradigm. It grew out of studies pioneered most famously by the zoologist Theo Colborn. While examining fish in the Great Lakes during the 1980s, Colborn found evidence that prenatal exposure to some chemicals impacted development in newborn fish. The findings elicited concern and warranted serious follow up to evaluate the potential effect of these chemicals on humans. She convened a conference of like-minded scientists and activists in Wingspread, Wisconsin, in 1991, which culminated in the Wingspread Consensus Statement. As a group, these scientists and activists believed many chemicals—not just BPA—might not harm people at high doses but may be harmful at extremely low doses undetected by traditional tests. They promoted this thesis in the sensational best-selling book *Our Stolen Future*. This is the beginning of what became known as the low-dose hypothesis.¹⁶

Activists also zeroed in on evidence that particles of BPA leached from the plastic and showed a laboratory response on estrogen-responsive cancer cells.¹⁷ Many natural substances also subtly alter the way the hormones in our endocrine system work, including clover, many fruits, and soy. The Wingspread activists coined the term “endocrine disruptor” to describe this modest effect, rebranding what until that point had been known, more innocuously, as an endocrine mediator. The phrase was clearly designed to be a slogan, not unlike the Right calling the estate tax a “death tax” or campaigners on abortion issues branding themselves “prochoice” or “prolife.” At first, journalists and other

scientists carefully put the term in quotation marks to signify that this was a highly charged political term, but over time the quotation marks disappeared.

Certainly, BPA can affect the endocrine system, as can many substances, including foods such as tofu. Reproductive and neurodevelopmental effects of BPA at low doses in animals, including environmental doses potentially relevant to humans, have been the subject of ongoing scientific reviews and study. In its January announcement, the FDA said that this “novel” idea does “describe BPA effects” in laboratory animals, but most scientists and regulators remain doubtful that low doses of certain chemicals, natural or synthetic, significantly disrupt the human metabolic and reproductive systems. Only a tiny fraction of studies on BPA indicate serious toxic or hormonal effects on rodents, and then only when consumed at levels at least five hundred thousand times greater than humans consume.¹⁸ Some studies have shown estrogenic effects and reproductive impacts on male rodents, while others have not. Doubts also have been raised about the meaningfulness of these studies because of what scientists call nonrepeatability.

Also in question is to what degree the results of studies conducted on rodents can be applied to humans. Animal tests are considered an important step in evaluating chemical toxicity, but by themselves they are of “limited usefulness to human health,” as noted in an article in the *British Medical Journal*.¹⁹ An axiom of laboratory research is that chemicals tested on animals rarely have identical effects on humans at comparable dosages, and sometimes have no discernible effect because of inherent flaws in the studies and significant differences between the species in biochemistry, immune systems, and other anatomical systems.

More problematic, the novel low-dose endocrine-disruptor hypothesis is based almost entirely on administering BPA to rats by injection. Regulatory agencies do not put much stock in tests in which a substance is introduced to subjects in a different way than humans would come into contact with it. The European Food Safety Authority, which uses the precautionary principle in its deliberations, as well as the FDA, the NTP, Health Canada, and, in fact, every regulatory body that has systematically assessed the risks of BPA either rejects studies of injected BPA outright or gives preference to studies in which BPA is ingested instead.

Because humans are exposed to BPA almost exclusively through food,²⁰ why would scientists seeking to evaluate whether it is dangerous design tests in which it

is injected rather than ingested? For one, it is much easier to do those tests. But there is another, more problematic, explanation: orally ingested BPA quickly becomes harmless, while the toxic qualities of injected BPA are preserved, so studies testing the orally injected chemical are more likely to show effects.

Peer-reviewed studies consistently show that BPA taken orally is rapidly detoxified, first in the gastrointestinal tract and then in the liver, by enzymes that transform BPA into a water-soluble chemical known as BPA-glucuronide, which repeated studies have shown is harmless. This sugar substance has a half-life of six hours and is easily excreted in urine.²¹ Even when used in dental sealants, BPA exits the system in fewer than twenty-four hours.²² While some studies in which rodents were injected with BPA have shown some effects, studies in which rats receive the chemical orally have shown little effect, if any.²³ In other words, repeated tests over decades have shown that BPA that makes its way into human bodies is quickly neutralized and made innocuous.

Perhaps the most common, and seemingly damning, allegation against BPA, and one that shows up repeatedly in media reports, is that the Centers for Disease Control and Prevention (CDC) has found the chemical in the urine of 95 percent of adults and 93 percent of children over six years old.²⁴ That sounds frightening. But is it? How journalists and social scientists frame this often-stated fact is a good barometer of whether they are genuinely wrestling with complex science or whether they are mouthpieces, intentionally or not, for a predetermined, chemophobic perspective.

Consider, for example, a news report on the FDA's January announcement in the *New York Times*. Denise Grady dispassionately writes that a "study of more than 2,000 people found that more than 90 percent of them had BPA in their urine."²⁵ But such findings are little more than artifacts of state-of-the-art biomonitoring techniques that find potentially toxic chemicals of all kinds—natural and synthetic—omnipresent in the human body. Because available technology can detect even vanishingly low concentrations, scientists are likely to find virtually anything for which they look. To put this in perspective, CDC tests have also found dietary estrogens (also called phytoestrogens)—known hormone disruptors that occur naturally in a vast array of products such as nuts, seeds, soy, tofu, wheat, berries, bourbon, and beer—in the urine of more than 90 percent of people and at levels one hundred times higher than

traces of BPA. Repeated studies have shown that neither BPA nor dietary estrogens bioaccumulate. "In animal and human studies, bisphenol A is well absorbed orally," the CDC reports. "Finding a measurable amount of bisphenol A in the urine does not mean that the levels of bisphenol A cause an adverse health effect."²⁶

Of course, none of these qualifications appeared in news reports, not even in the *New York Times*, which has the resources to know better. Instead, they recirculated talking points from environmental activists. Without this contextual information, an innocent reader could easily be forgiven for concluding that the FDA overlooked damning facts in deciding not to ban BPA.

Scientific Split

The question of whether BPA is harmful revolves around the murky issue of toxicity. As Paracelsus, the father of toxicology, observed, "All things are poison and nothing is without poison, only the dose permits something not to be poisonous." The world is awash in chemicals, natural and human-made. Approximately one hundred thousand synthetic chemicals are approved for consumer products and industrial processes, and very few are considered harmful at levels found in humans. Many natural substances in our foods are toxic, including some essential and beneficial vitamins and minerals, when consumed in large quantities. The only significant science-based question is whether a particular substance is harmful at the trace level at which it is metabolized in the human body.

The debate over BPA has been riddled with distortions over dose. Advocacy groups quickly jumped on a study from China that suggested that BPA could cause male sexual dysfunction, as the EWG, the *Los Angeles Times*, and other organizations warned in outrageous headlines. But the study that prompted this news blizzard focused on Chinese workers who handled the chemical in bulk, not on normal levels of exposure to BPA in foods.²⁷ The NTP has reported "negligible concern" that men exposed at nonoccupational capacities—in other words, men who are exposed to BPA from using plastic containers or consuming canned foods—would experience reproductive effects.²⁸

The scientific community appears to be divided into two conflicting camps when it comes to assessing BPA's risks. Regulatory authorities and scientists who rely on long-established study protocols are on one side, and they have concluded, almost unanimously, that BPA presents no serious harm. They represent the majority by far, but their views are often downplayed or even ridiculed by

advocacy groups and a small, but media-savvy, faction of scientists who embrace precautionary notions.

These sharp differences appear every time a new study comes out finding BPA is safe. In 2001, the NTP released an independent peer-reviewed study of the evidence for and against the novel hypothesis. In its conclusion, the report says, “The Subpanel is not persuaded that a low dose effect of BPA has been conclusively established as a general or reproducible finding,” although it did recommend further review.²⁹ Numerous studies followed including by the Harvard Center for Risk Analysis.³⁰ All of them raised doubts about the validity of the low-dose hypothesis and the reproducibility of findings based on tests performed on animals injected with BPA. Nevertheless, after each of these studies, the authors were attacked. Frederick S. vom Saal, an endocrinologist at the University of Missouri who has emerged as the most vocal critic of BPA, argued that these reports all failed to take into account the “latest knowledge” in endocrinology, developmental biology, and estrogen-receptor research.³¹

Scientists who had followed the strictest protocols and produced peer-reviewed studies were also accused of “collaborating with industry,” a charge designed to prevent serious reviews of their studies. After the Harvard Center endorsed the safety of BPA and challenged the low-dose hypothesis in its 2004 study, determined critics attempted to marginalize the findings—not because there were flaws in the data, but because the center had received funding support years before from the American Chemistry Council, General Electric, the Business Roundtable, and other business groups, and because John Graham, the center’s former director, had later joined the Bush administration.³²

Does receiving partial funding from corporations automatically undermine the credibility of independent studies? Diverse business groups with highly different motivations contributed in aggregate a fraction of the funding for the Harvard Center. But the center also accepts contributions from many other sources, including from the government. By inference, and absent any documentable problems with the data, anti-BPA advocates dismissed the studies as hopelessly compromised—and many media reports echoed the cynicism.³³ In some cases—such as the 2006 European Food Safety Authority study of the low-dose hypothesis supervised according to international protocols to ensure methodological rigor and statistical reliability—government agencies required the industry to provide funding.³⁴ Dismissing research

because of so-called industry ties is one of the cheapest tricks in any critic’s arsenal. Studies are either transparent or they are not. Data are robust or not. Conclusions can either be substantiated or not.

To respond to the growing consensus of BPA’s comparative safety, in 2006, vom Saal coordinated a conference that brought together thirty-eight scientists who advocated the low-dose endocrine-disruptor theory. Considering the lack of dissenting viewpoints, their summary conclusion, known as the Chapel Hill Consensus Statement, was hardly surprising. It found BPA associated with “organizational changes in the prostate, breast, testis, mammary glands, body size, brain structure and chemistry, and behavior of laboratory animals.”³⁵ Using inflammatory language uncharacteristic of science, vom Saal summed up their conclusion: “The science is clear and the findings are not just scary, they are horrific. When you feed a baby out of a clear, hard plastic bottle, it’s like giving the baby a birth control pill.”³⁶

The consensus viewpoint has been systematically rejected by the EPA and government regulators around the world. In 2008, the NTP released yet another extensive and expensive peer-reviewed analysis of BPA that again found no reason for serious concern about its effects on human reproduction or development in adults or children.³⁷ The NTP used its well-known code term “some concern” to characterize the possible effects of BPA on fetuses, which means it recommended further study but did not consider the chemical harmful or worthy of restrictions or health warnings. It made it clear that it reached that qualified conclusion because the rodent studies, which suggested some problems, were not “experimentally consistent”—many showed no problems, and tests could not be replicated. Yet news organizations consistently have misrepresented the NTP’s 2008 findings. In the most recent gross example, *Fast Company* began a wildly sensational exposé of BPA by baldly and inaccurately claiming the NTP had concluded: “BPA is dangerous to human health.”³⁸

In an attempt to address this persistent controversy, the EPA recently funded two multigenerational studies. Both studies failed to support the low-dose hypothesis. The most recent analysis, which appeared in November in *Toxicological Sciences*, a leading scientific journal, was particularly definitive. Carried out at the EPA’s National Health and Environmental Effects Research Laboratory based at North Carolina State University in Raleigh, it

was specifically designed to cover a wide range of BPA doses. L. Earl Gray Jr. and his colleagues concluded that BPA is an extremely weak estrogen not worthy of being called an “endocrine disruptor.” BPA was found to be so weak that even at levels of exposure four thousand times higher than the maximum exposure of humans in the general population, there were no discernible effects.³⁹

This comprehensive EPA study—which should have ended any reasonable debate over the low-dose, endocrine-disruptor, precautionary principle-fed hypothesis—immediately set off a new round of contretemps. *Consumer Reports*, other nonscientific media such as *Fast Company*, and activist blogs accused researchers of using a strain of rat that is extremely insensitive to estrogen. This is a technical catfight over study design, but it is worth addressing, as it highlights the beleaguered position of ban proponents trying to explain why other scientists have not been able to consistently replicate the few studies showing that BPA has no or only modest estrogenic effects. The “you used insensitive rats” argument originated with vom Saal, who has advanced it repeatedly,⁴⁰ although the EPA’s senior reproductive toxicologist, who leads the agency’s team that investigates endocrine disruption, has dismissed it as absurd.⁴¹

Vom Saal and twenty-three of his colleagues responded to the L. Earl Gray Jr. article with a blistering letter rehashing the same discredited argument.⁴² Gray and his team returned the volley, dismantling the critique. They address in particular why the appropriate rat strains were used, citing similar studies by Health Canada and the NTP, among numerous organizations. Its key statement: while vom Saal dismisses studies by Gray and others as “flawed,” governmental regulatory agencies have consistently relied on them while dismissing as “inadequate,” “not replicable,” and “extremely limited” the hodgepodge of low-dose studies. Their conclusion: “BPA did not display any estrogenicity.”⁴³

Going Forward

Unable to prevail on the science, ban proponents have begun shifting their focus from the laboratory to politics. In December, Charles Schumer and Kirsten Gillibrand, both Democratic senators from New York, proposed the BPA-Free Kids Act, intended to outlaw the use of BPA in food container linings for infants and toddlers.⁴⁴ Activists are also targeting state and local governments, employing the same tactics that failed to persuade the

FDA but that have worked wonders in manipulating media coverage and fanning public anxiety. Minnesota, Connecticut, Washington, Wisconsin, and three counties in New York have passed bans on products or beverage containers for children, basing it on the precautionary principle and citing fears of harm, and more jurisdictions are considering restrictions. (See appendix.)

That fear strategy prevailed in Canada in 2008. Activists mounted a massive campaign designed to frighten parents and pressure the media. The effort was chronicled gleefully in the book *Slow Death by Rubber Duck*.⁴⁵ Public concerns led to an intense investigation by Health Canada. When Mark Richardson, the chief scientist and head of the investigation, said the evidence showed that the dangers of BPA were “so low as to be totally inconsequential” and compared its estrogenic effects to tofu, activists and the media, led by the *Globe and Mail* of Toronto, mounted an attack on his credibility that led to his reassignment.⁴⁶ Months later, when the report was finally issued, Health Canada firmly rejected claims that BPA was unsafe. “The current research tells us the general public need not be concerned,” the report declared after reviewing hundreds of studies. “Bisphenol A does not pose a risk to the general population, including adults, teenagers and children.”⁴⁷

Nonetheless, the precautionary principle is embodied in Canadian (and EU, but not yet in U.S.) law. Considering the hysteria generated, and even absent convincing scientific evidence, Health Canada was compelled to ban BPA in baby products. Citing public anxiety, Health Canada banned BPA for use in products for infants and children in April 2008. “Even though scientific information may be inconclusive,” it wrote, “decisions have to be made to meet society’s expectations that risks be addressed and living standards maintained.” It was the first (and still only) restriction on BPA at a national level. Activists now regularly cite the Canadian ban, arrived at through fear rather than based on scientific evidence, as “proof” that regulatory bodies are now finding BPA harmful.

The stage then shifted to Europe, which has even stricter precautionary standards than Canada. In a stunning turn of events, health authorities in France rejected the opportunity to follow in Canada’s footsteps. “Canadian authorities banned BPA under public pressure and without any serious scientific study,” Minister of Health Roselyne Bachelot said during an inquiry at the National Assembly in March 2009. “The precautionary

principle is a principle of reason and under no circumstances a principle of emotion,” she concluded, noting, “It applies when there are no reliable studies. Here, there are reliable studies, which conclude, with current scientific data, that baby bottles containing this chemical compound are innocuous.”⁴⁸

Policymakers use what is called risk-risk analysis to evaluate chemicals. They consider two key questions. At what levels could a substance cause harm? What would be the possible unintended consequences if a useful chemical were pulled off the market? The only justification for banning BPA outright would be if it could be shown, based on empirical science, that current hazards and costs outweigh its clear benefits. The food and packaging industries have had to make just such a calculation. Caught in the crossfire between activists and science, they are eager to respond to consumer concerns, legitimate or not, but they are unable to justify changes that will create worse problems and increase prices. For example, oleoresin—an option often promoted for use as a metal-can liner—costs 14 percent more than BPA and does not work for canned acidic foods like tomatoes. According to Aaron L. Brody, a food-packaging expert who teaches at the University of Georgia, “If [food packagers] had an economic can coating that could be applied to food and/or beverage cans today, the coatings industry, the canning industry, would have applied it instantly to get this monkey off their back.”⁴⁹

The FDA, for one, has done its own risk analysis. At an agency news conference on January 15, Deputy Commissioner Sharfstein was asked whether the low estrogenic impact of BPA warranted further restrictions. He responded as a scientist, carefully balancing costs and benefits, saying, “FDA does support the use of bottles with BPA because the benefit of nutrition outweighs the potential risk of BPA.”

Considering the immense efforts to demonize BPA, regulators are under intense political pressure to fund studies and tests, perhaps indefinitely. In a world of finite research dollars, policymakers must ask whether spending hundreds of millions of dollars on yet more research into BPA imposes an unnecessarily high cost on science and society. Richard Sharpe, head of the Centre for Reproductive Biology at the Medical Research Institute in Edinburgh and an internationally recognized pioneer on the effects on endocrine disruption by chemicals in the environment, suggests in a recent article that

governments are squandering research dollars on what has evolved from a once-legitimate scientific inquiry into an obsession. Writing in *Toxicological Sciences*, before the FDA’s recent reaffirmation of BPA’s safety, Sharpe writes:

Fundamental, repetitive work on bisphenol A has sucked in tens, probably hundreds of millions of dollars from government bodies and industry which, at a time when research money is thin on the ground, looks increasingly like an investment with a nil return. . . . If this opinion piece does nothing else, I hope that it will remind us all of the central importance to be attached to the repeatability of experiments and how we should react when a study proves to be unrepeatable.⁵⁰

Scientific “facts” are constantly being reevaluated. That is the essence of the research ethic that depends on subjecting empirical data to challenge and review. An explanation accepted as truth is discarded when more robust data suggest a more empirically solid alternative. Such creative destruction embodied in the process of scientific hypothesizing and empirical studies provides a useful framework for understanding what the science community should do about BPA.

Now that the current FDA has weighed in on this issue and yet another international oversight agency has reaffirmed the chemical’s safety, we might legitimately echo Sharpe’s statement and ask when enough is enough. To navigate the complexities of modern society, policymakers need standards and established systems—objective science—to guide them in weighing the benefits and potential hazards of chemicals, drugs, and any other concerns. But the moment we abandon standards for fashion or due to political pressure—no matter how superficially attractive that may seem—we place the entire system of checks and balances in danger.

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Notes

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Appendix: Status of Federal, State, and Local Legislation on Bisphenol A (BPA)

	Bill No.	Summary	Status
Federal	S. 593, H.R.1523	Would treat BPA as adulterating the food or beverage; applicable to all food and beverage containers	Pending
	S. 753	BPA-Free Kids Act	Pending
California	S.B. 797	Toxin-free Toddlers and Babies Act, would prohibit the manufacture, sale, or distribution of any bottle, cup, or liquid, food, or beverage in a can or jar that contains BPA at a level above 0.1 parts per billion, under specified conditions	Pending
Connecticut	H.B. 6572, H.B. 5499, S.B. 791	Bans any products containing BPA marketed for the use of children under the age of three years; bans any reusable food containers or jars or cans containing food or beverage products that contain BPA; requires labeling of certain products containing BPA	Passed
Hawaii	H.B. 796, S.B. 815	Would prohibit the manufacture, sale, or distribution of toys and child-care articles containing certain toxic chemicals	Pending
Illinois	H.B. 2485, S.B. 2170	Child-Safe Chemicals Act, would prohibit the sale or distribution of products intended for a child under three years of age that are used to contain food or liquid if the product contains BPA	Pending
Maine	L.D. 837	Would identify chemicals of highest concern, including BPA, requiring manufacturers to disclose use of priority chemicals in children's products and authorizing Maine to require safer alternatives, if available, that are effective and affordable	Pending
Maine	S.B. 213, H.B. 15	Would prohibit the manufacture, sale, or distribution of specified toys or child-care articles containing BPA	Passed Senate, Pending House
Massachusetts	H.B. 2068	Would establish regulations categorizing BPA as a hazardous substance when it is contained in toys or child-care items manufactured, sold, or distributed in the state	Pending
Massachusetts	S.B. 432	Would prohibit the manufacture, sale, or distribution in commerce of any toy or child-care article that is intended for use by a child under three years of age if that product contains BPA	Pending
Massachusetts	Public Health Advisory	Advises parents of children up to two years old to avoid products that contain BPA for making or storing infant formula and breast milk and to avoid products that may contain BPA	Issued by the Governor
Michigan	H.B. 4522	Would prohibit the manufacture, sale, or use of certain children's products; would prohibit child-care facilities from using or having certain children's products containing BPA on facility premises	Pending
Minnesota	S.B. 247, H.B. 326	Prohibits BPA in products for young children	Passed
Missouri	H.B. 848	Would prohibit the manufacture, distribution, or sale of any bottle, cup, or other container that contains BPA at a level above 0.1 parts per billion, if the container is intended to be used by infants or children three years of age or younger	Pending
New Jersey	A.B. 3646	Would prohibit the use of "toxic-free" labeling on children's products containing BPA	Pending
New Mexico	H.B. 225	Would prohibit the sale of children's toys that contain certain levels of BPA	Pending
New York	A.B. 6919, S.B. 3296	BPA-Free Children and Babies Act, would prohibit the manufacture, distribution, and sale of child-care products, toys, and beverage and food containers containing BPA	Passed Assembly, Pending Senate
Oregon	H.B. 3703	Would make it an unlawful practice to manufacture, distribute, or sell liquid or food in containers made with BPA if the liquid or food is intended primarily for consumption by children under three years of age	Pending
Oregon	S.B. 1032	Would have made it an unlawful practice to manufacture, distribute, sell, or offer for sale any commercially available children's beverage container made with BPA; would have required manufacturers of children's beverage containers made with BPA to recall containers	Failed
Pennsylvania	H.B. 221	Would prohibit the manufacture, distribution, or sale of food and beverage containers intended for children three years of age and under containing BPA at a concentration exceeding 0.1 parts per billion	Pending
Rhode Island	H.B. 5038	Would prohibit the manufacture, sale, or distribution of certain toys or child-care articles containing BPA	Pending
Rhode Island	H.B. 5132	Would ban the use of BPA from all products intended for use by children, such as items to help babies while teething, toys, and soft plastics	Pending
Texas	H.B. 792	Would require products containing BPA to be labeled: "This product contains bisphenol-A, a chemical that has been shown to be a developmental, neural, and reproductive toxicant"	Pending
Texas	H.B. 1524, H.B. 2775	Would prohibit the manufacture or sale of certain products intended for children three years of age and under	Pending
Vermont	H.B. 373, S.B. 76	Would prohibit the manufacture, sale, or distribution in commerce of any food or beverage container, child-care article, or toy containing BPA in any concentration	Pending
Washington	H.B.1180, S.B. 5282	Prohibits the manufacture, distribution, or sale of certain food and beverage containers and sports bottles containing BPA	Passed
Wisconsin	S.B. 271, A.B. 405	Prohibits the manufacture and sale at wholesale of certain baby bottles and cups for children that contain BPA and creates labeling requirements	Passed
Chicago	Municipal Code	Prohibits the sale of empty containers composed of BPA by amending the Municipal Code of Chicago 7-28	Passed
New York: Suffolk County	Resolution 1017	Prohibits the sale or offer for sale of children's beverage containers that contain BPA within Suffolk County	Passed
New York: Albany County	Local Law C of 2009	Prohibits anyone from selling or offering for sale children's beverage containers that contain BPA within Albany County	Passed
New York: Schenectady County	Local Law 2-09	Prohibits anyone from selling or offering for sale children's beverage containers that contain BPA within Schenectady County	Passed

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