Competitive Enterprise Institute
1899 L Street, NW • 12th Floor • Washington, DC 20036
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Advancing Liberty – From the Economy to Ecology
April 21, 2011 **No. 174**

Anti-BPA Packaging Laws Jeopardize Public Health

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In public policy, bad ideas have an unfortunate tendency to spread. Lawmakers in several states are considering legislation similar to a bill passed last week in Maryland that may actually increase food-borne illnesses.

The Maryland legislation (SB151 and HB4) bans infant formula and baby food packaging that contains more than 0.5 parts per billion (ppb) of the chemical Bisphenol A (BPA). The standard is so stringent that it essentially bans BPA in these packages—for no good reason. In fact, regulatory bodies around the world have found BPA levels safe up to 3,000 parts per billion.[1]

This anti-BPA legislation is based on environmental activists' wrongheaded claims that BPA poses an unreasonable risk to human health—specifically to children—but the overwhelming body of research suggests otherwise. Unfortunately, as more of these misguided bans succeed, policymakers are likely to begin targeting BPA use in all types of food packaging, as several bills already introduced in Congress do.

Ironically, these policies threaten to undermine food safety because BPA is used to make resins that line metal cans and other packaging to prevent the development of dangerous pathogens and other contamination. And there are few good alternatives should lawmakers eventually ban BPA. In other words, misguided bans on use of BPA in food packaging could have serious, adverse public health implications.

Anti-BPA Legislation in the States and Beyond. BPA has been the subject of state and federal legislation for several years. The Maryland law follows the bad precedent set by a 2009 Connecticut law that banned BPA for infant formula packaging and baby food containers starting in October 2011.[2] Apparently, implementation of that law is proving problematic, and the legislature is considering delaying implementation

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until October 2012. Yet delaying implementation is only a short-term solution to this unworkable public policy.

Several states and localities also have passed BPA regulations, including Minnesota (effective January 2010), Chicago (effective January 2010), and Suffolk County, New York (effective June 2009). Most of these laws focus on banning plastic sippy cups for toddlers and baby bottles made with BPA, but the focus of new legislation is now shifting to food packaging.

This year in California, Assemblymember Betsy Butler (D-Marina del Rey) has introduced the "Toxin-Free Infants and Toddlers Act, (AB 1319),[3] which would mandate a standard even more absurdly stringent than the one that passed in Maryland—setting the BPA limit at 0.1 parts per billion for infant formula and baby food containers. In Missouri, Rep. Kevin McManus (D-Kansas City) has introduced HB 728, which would set the same ridiculous standard for Missouri.[4] Both bills call on manufacturers to provide the "least toxic" alternative for BPA, which is meaningless if such alternatives simply do not exist. In fact, the absence of good alternatives is likely why the state of Connecticut is considering delaying its 2009 ban on BPA use for infant formula and baby food packaging.[5]

The Oregon Senate recently voted in favor of SB 695, which would ban BPA use for children's food containers, baby bottles, and sippy cups starting in January 2013.[6] The Oregon House has yet to vote on the bill. Green activists were unable to get an all-out ban a BPA in other food packaging, but they did get a provision they can use to build momentum for such bans in the future: The bill creates a panel to "study" the potential for similar bans on other food packaging. However, BPA has already been studied extensively around the world. This new state-level panel is unlikely to discover any new information, but instead will simply be used to push the activist's agenda to ban more uses of BPA.

Outright BPA bans in food packaging have been considered at the federal level. Last Congress, Sen. Charles Schumer (D-N.Y.) introduced the BPA-Free Kids Act of 2009 (S. 753), which would ban BPA in containers used for products for children under three, excluding metal cans. Also last Congress, in the House, Rep. Edward Markey (D-Mass.) introduced the Ban Poisonous Additives Act (H.R. 1523), an extreme proposal to ban BPA in *all* food-contact containers. And Sen. Diane Feinstein (D-Calif.) attempted to attach an amendment to the Food Safety Act (S. 510) last year that would have banned BPA in all food packaging, which fortunately the Senate leadership convinced her to remove.

Heading north of the border, a recent ban in Canada is particularly instructive of the politicized nature of the anti-BPA campaign. In 2010, the Canadian government banned BPA use for making baby bottles. However, it issued the ban after its own scientific review of BPA could find no risks associated with existing exposures through consumer products. Health Canada noted in a statement: "The scientists concluded in this assessment that Bisphenol A exposure to newborns and infants is below levels that cause

effects; however, due to the uncertainty raised in some studies relating to the potential effects of low levels of Bisphenol A, the Government of Canada is taking action to enhance the protection of infants and young children."[7]

The likely real reason for the move can be gleaned from this comment from Canadian Environment Minister John Baird: "Many Canadians, especially mothers of babies and small children in my own constituency of Ottawa West-Nepean, have expressed their concern to me about the risks of Bisphenol A in baby bottles."[8] Hence, the government felt the political need to regulate because media and activist hype had created unwarranted fears among parents.

What Is BPA? Bisphenol A is a chemical intermediary used in the manufacturing of certain products, including polycarbonate plastics and epoxy resins. These plastics are used in a variety of products: baby bottles, five-gallon water jugs used in water coolers, medical equipment, sports safety equipment, cell phones and other consumer electronics, household appliances, and many other products. The resins are used for industrial flooring, adhesives, primers, coatings, and computer components.

BPA makes polycarbonate plastics exceptionally strong and resistant to breakage and to relatively high heat. It is remarkably durable and easily sterilized, making it well suited for reuse and recycling. In contrast, glass can break easily before reaching recycling facilities and mix with other glass, ceramics, and other items. Mixed broken glass is difficult to recycle and often discarded. Glass breakage also poses obvious safety risks and increases the potential for significant food waste.

The transparency of polycarbonate plastics offers unique benefits over non-transparent plastics. Transparency has value for such things as safety goggles or in settings, such as in hospitals, where it is important to have a clear view of contents in various containers. It is also relatively lightweight in comparison to alternatives like metal or glass, a characteristic that offers important safety attributes for individuals who must lift polycarbonate products during shipping and stocking, as well as for consumers. The lightweight material also requires less fuel to transport, saving energy and money.

BPA is also used to make resins and coatings that are suitable for application to a wide range of surfaces at a wide range of temperatures. As a result, it helps prevent corrosion and increases product durability.

Specific applications of BPA-related products include:

Safety products. Polycarbonate plastics are valuable for safety goggles, break-resistant lenses, helmets, kneepads, and a wide variety of sporting goods.

Sanitary food packaging. When used to make coatings for canned foods and beverages, BPA resins prevent food from bacterial and rust-related contamination—a critical public health need. It also reduces food spoilage, maintains food quality and taste, and extends food shelf life.

Medical devices. BPA is used in kidney dialysis equipment, cardiac surgery products, surgical instruments, connection components to transport fluids to and from patients, and many other vital applications. One chemist representing the medical division of Bayer Corporation notes the importance of polycarbonate plastics in providing good medical treatment: "Possessing a broad range of physical properties that enable it to replace glass or metal in many products, polycarbonate offers an unusual combination of strength, rigidity, and toughness that helps prevent potentially life-threatening material failures. In addition, it provides glasslike clarity, a critical characteristic for clinical and diagnostic settings in which visibility of tissues, blood, and other fluids is required."[9]

Sanitary water distribution and recycling. When used to make five-gallon water jugs, BPA has important public health and environmental benefits. The bottles offer sanitary transport of bulk supplies of bottled water, which is particularly necessary in locations where tap water is compromised or where quality is low in terms of taste. In addition, the durability of this product means that few of these bottles ever enter a landfill. These bottles are reused, on average, 35 to 50 times and then are recycled. They are a true private-sector recycling success story.

Environmental applications. BPA is used in a variety of environmental products. For example, resins are used in "green building" products, including solar panels, skylights, walls, and windows,[10] as well as numerous other building components.

Corrosion prevention. BPA-related resins are used not only to prevent corrosion and bacterial development in food cans, but also to protect many other things—including cars, bicycles, and components of homes—from corrosion. The resins are also used in a variety of industrial applications. Thus, it reduces the waste and costs associated with more conventional repairs and replacements.

Consumer products. BPA-related products make possible a host of consumer goods that we often take for granted, yet contribute greatly to modern life. Polycarbonate plastics are used for CD cases, cell phones, cameras, hair dryers, computers, televisions, automobile parts, appliances, and many more items.

Negligible Risk. BPA's applications for food packaging and containers, particularly uses for water cooler jugs, canned foods, and baby bottles, have been the focus of much debate. In wide use for over 50 years, BPA has been extensively studied for potential impacts on human health. Some studies report no linkages between BPA and health effects. Others allege potential links between BPA and cancer, while others suggest that BPA can produce "endocrine mimicking" effects. Some have even claimed a link between BPA and obesity.

This large body of research has failed to find a strong relationship between current consumer exposures to BPA and health effects. Yet the issue continues to get considerable media coverage as environmental activist groups and sensationalist news

reports allege that BPA poses serious public health threats which warrant increased regulations and bans.

Washington State Rep. Mary Lou Dickerson (D-Seattle) said in March 2009: "BPA is a dangerous chemical that should never get anywhere near a baby or young child's lips.…Imagine giving a baby a bottle laced with a cancer-causing chemical."[11] Such comments may spark fear and garner press coverage for lawmakers, but they have little ground in reality. The real issue is whether children, or any other subset of the population, are ever exposed to levels high enough to pose problems. The data indicate that they are not, as detailed below.

Exposures. Risks associated with various substances are related to the dose and duration of exposure. High exposures to certain substances over decades can pose significant cancer risks. Different substances will have effects at different exposure levels, but the basic rule for all is that risk decreases with declining exposure level. At trace-level doses, risks are negligible. This is good news because humans are constantly exposed to thousands of trace chemicals every day, from man-made chemicals to naturally occurring ones.

Concerns arise when exposure to a specific chemical reaches levels that cause adverse reactions, either acute effects (i.e., poisoning) from extremely high doses or long-term effects (i.e., cancer) from relatively high doses over several decades. Accordingly, U.S. regulators assess the levels at which certain chemicals might trigger a response and set targets to keep human exposures below levels of concern, usually hundreds if not thousands of times lower than the lowest level that could have an adverse effect.

The U.S. Environmental Protection Agency (EPA) set such targets for BPA relying on dosing studies with rodents. It determined that the exposure level for BPA in animals at which there was no observed effect is 50 milligrams per kilogram of body weight per day (mg/kg body weight/day). It then assumed the risk to humans would be much higher and estimated that a safe human dose is 0.05 mg/kg body weight/day.

Like the EPA, the European Food Safety Authority (EFSA) estimates the safe BPA exposure level. In 2004, it estimated a safe level of BPA exposure at 0.01 mg/kg body weight/day. However, the European Commission (EC) also translates its safe exposure level into what its calls a "specific migration limit" (SML). This limit is designed to ensure that the amount migrating into food does not produce public exposures above the pre-determined safe level. Accordingly, the Commission determined that a SML for BPA is 0.6 parts per million (ppm), or 600 ppb, which it included in its 2004 directive on plastics.[12] However, this estimate was considered temporary until the EFSA could further evaluate the science.

In 2006, the EFSA determined that its safe level was needlessly restrictive—and it agreed with the EPA estimate of 0.05 mg/kg body weight/day standard,[13] which translates into a higher SML of 3,000 ppb.[14] However, the EC has not changed its official SML, probably

out of fear of prompting criticism from the green lobby. The Japanese government set its SML for BPA at 2.5 ppm or 2,500 ppb.[15]

Accordingly, safe BPA levels most likely range somewhere higher than the very cautious government assessments ranging from 2,500 and 3,000 ppb. Yet the Maryland law limits BPA from packaging to the absurdly low 0.5 ppb, which makes no scientific sense. In fact, it is completely unnecessary. According to a National Academy of Science report, total BPA exposures in the U.S. amounts to about 6.3 ppb from food cans—leagues below scientifically determined safe levels.[16]

Moreover, a peer-reviewed analysis by Michael A. Kamrin, professor emeritus at Michigan State University, published in *Medscape General Medicine*, assesses the best available data on consumer exposure to BPA. It reveals that consumers are most likely exposed to BPA at levels that are 100 to 1,000 times lower than EPA's estimated safe exposure levels. Kamrin notes further that the research on BPA also shows that the exposure levels per body weight are similar for adults and children, which indicates that infant exposure is not significantly higher. Moreover, the risk to humans is probably much lower than these estimates suggest because humans metabolize BPA faster and better than rodents. Accordingly, attempting to shrink existing exposure levels with Maryland's absurdly stringent standard is highly unlikely to produce any public health benefit.[17]

Endocrine Science. The Environmental Working Group dubs BPA "a potent endocrine-disrupting chemical" that regulators should ban.[18] The science does not support such claims.[19] Scientific research identifies BPA as "weakly estrogenic"—hardly potent—and such effects are observed at levels far higher than existing consumer exposure levels.[20] But even safe, natural food products, like soy, have such attributes. A broader understanding of this issue helps place it in perspective.

Humans are regularly exposed to such chemicals, both manmade and natural. Again, the dose level is critical. Humans are regularly exposed to estrogen-mimicking compounds produced by plants—so-called phytoestrogens—in our everyday diet. Phytoestrogens, for example, are found in all legumes, with a particularly high level found in soy.

The impact of weakly estrogenic synthetic substances like BPA is insignificant compared to human exposures to naturally occurring phytoestrogens in the human diet. According to data from a 1999 National Academy of Sciences study, exposure to natural phytoestrogens is 100,000 to 1 million times higher than exposure to estrogen-mimicking substances found in BPA.[21] "Given the huge relative disparity between the exposure to phytoestrogens as compared to BPA concentrations, the risk of BPA in consumer products appears to be about the same as tablespoon of soy milk," notes researcher Jonathan Tolman.[22] We have little to fear from soy milk, so we have even less to fear from BPA and similar synthetic compounds.

Research does indicate that BPA, like soy, can bind to estrogen receptors on the human body. At high levels (probably quite high), this attribute in theory could produce

hormone-related effects, such as early sexual development in females. Yet such impacts have not been observed in humans exposed to BPA at existing exposures from consumer products. Effects have been observed in rodents that were exposed to very high levels of BPA via injections and, in some cases, among animals that were orally fed high levels of the chemical.

Rodent Tests. Most of the concerns about BPA are related to findings from rodent tests alleging a link between this substance and various potential health problems from obesity to cancer.[23] Regulatory bodies have found these findings unreliable for a variety of reasons, including:

- In many studies, the animals were exposed to levels far above existing human exposures.
- These studies fail to account for interspecies differences.
- Exposure routes were different: The animals were injected with BPA, while humans ingested it.

Exposure disparities. As noted, the dose level in many rodent studies is excessive—far beyond human exposure levels. In fact, even healthy foods, from carrots to celery, produce cancer in rodents when administered in high doses.[24] Fortunately, BPA exposures from consumer products are extremely low and highly unlikely to pose public health impacts.

These studies are not definitive and have been subject to criticism for problems associated with methodology and consistency. The European Union (EU) assessment notes: "The Panel considered that low-dose effects of BPA in rodents have not been demonstrated in a robust and reproducible way, such that they could be used as pivotal studies for risk assessment." [25] Similarly a U.S. National Toxicology Program study also explained the problems with relying on these studies to draw conclusions:

> These "low" dose findings in laboratory animals have proven to be controversial for a variety of reasons including concern for insufficient replication by independent investigators, questions on the suitability of various experimental approaches, relevance of the specific animal model used for evaluating potential human risks, and incomplete understanding or agreement on the potential adverse nature of reported effects.[26]

Interspecies differences. The risk of BPA is probably even lower than the EPA estimates of 50 mg/kg body weight/day because humans are less sensitive to BPA than are the lab animals that were used to set the standard. Humans tolerate far higher doses than animals because the human body breaks down BPA more easily and passes it out via urination. Indeed, we see this effect with many substances.

For example, humans can consume moderate doses of Ibuprofen, chocolate, or grapes without ill effect. But these substances are toxic to the family dog, which lacks the same capacity to metabolize them. Such interspecies differences highlight the limitations of

animal studies. In the case of BPA, we use animal studies to set standards, but should remain aware that the science indicates that the effects on humans are different.

For this reason, BPA is not only less toxic; it is less likely to pose endocrine-related effects. The human body quickly breaks down BPA into substances that do not bind with estrogen. The EU study reports:

> [T]he species differences in toxicokinetics, whereby BPA as parent compound is less bioavailable in humans than in rodents, raise considerable doubts about the relevance of any low-dose observations in rodents for humans. The likely high sensitivity of the mouse to estrogens raises further doubts about the value of that particular species as a model for risk assessment of BPA in humans.[27]

Exposure routes. Many studies rely on injection of BPA in high concentrations into rodents rather than feeding them the substance. This approach is of limited relevance to human exposures, which occur via trace amounts in our diets. However, some studies suggest that rodents have suffered health effects from exposures to BPA at levels equivalent to current estimated human exposures.

Human data. Absent a compelling body of evidence from rodent studies, activists have turned to human studies which they say show the dangers of BPA. However, these studies are limited and have been unable to produce conclusions about BPA impacts on humans. The National Toxicology Program report notes:

> Drawing firm conclusions about potential reproductive or developmental effects of Bisphenol A in humans from these studies is difficult because of factors such as small sample size, cross-sectional design, lack of large variations in exposure, or lack of adjustment for potential confounders. However, the NTP Expert Panel on Bisphenol A (2) concluded that several studies collectively suggest hormonal effects of Bisphenol A exposure (24, 92, 97) including one in occupationally exposed male workers likely exposed through multiple routes including inhalation (24).
>
> The NTP concurs with findings of the recent evaluations (2, 3) that while these studies may suggest directions for future research, there is currently insufficient evidence to determine if Bisphenol A causes or does not cause reproductive toxicity in exposed adults. There is also insufficient evidence in humans to determine if Bisphenol A does or does not cause developmental toxicity when exposure occurs prenatally or during infancy and childhood.[28]

In other words, studies have been unable to establish a significant risk to humans even where humans were exposed to relatively high levels in occupational settings. The risks to consumers are much lower.

Absent any strong data showing actual effects associated with trace BPA exposures in the human diet, some activists have devised studies that do not even bother to make associations. Instead, they try to indict the substance *based on exposure alone*. For example, the Environmental Working Group produced a paper that measures BPA levels in human urine.[29] But such measurements actually support the fact that BPA is having little impact since it passes through the body quickly.

Moreover, the mere presence of any chemical BPA in human urine, blood, or body fat does not mean there is a public health problem. At every point in human history, the body has been exposed to, contained, or passed chemicals from a variety of environmental sources—natural and made-made. Stone-age hunter-gatherers were sure to have more chemical byproducts of burning wood for fuel, while people living today are likely to have industrial chemicals associated with urban living. The issue is not whether the chemicals derive from primitive lifestyles or modern ones; the issue is the risk level. Substances that are toxic at one level often have no impact at trace levels.

For example, most people's urine might contain traces of cyanide. According to the Agency for Toxic Substances Disease Registry (ASTDR) of the Centers for Disease Control and Prevention (CDC), "Exposure to high levels of cyanide harms the brain and heart, and may cause coma and death."[30] Yet trace levels of cyanide in our urine results from eating some very healthy foods that are loaded with many beneficial anti-oxidant chemicals—such as almonds or Brussels sprouts—but contain natural traces of cyanide. Hence, low-levels of this toxic substance in our urine are still not evidence of a problem. Rather, it is evidence that trace cyanide passes through our bodies without any measurable ill effect. Thus, the benefit of eating these good foods well outweighs risks of trace chemicals they contain.

The CDC noted in a report on this same topic: "Just because people have an environmental chemical their blood or urine does not mean that the chemical causes disease. The toxicity of a chemical is related to its dose or concentration in addition to a person's susceptibility."[31] A key point to remember is the fact that, although we have chemicals of modern lifestyles in our bodies, it is those lifestyles that have extended the human lifespan. In fact, humans are living longer than ever before, even as we synthesize and use a host of chemicals.[32]

Comprehensive Studies and Reviews. Myriad studies on BPA continue to become available, each with its own claims and limitations. However, even when studies claim to have discovered a new link, it is important to remember that no single study is likely to overturn the complete body of research. In fact, methodological problems and applicability of new studies continues to be an issue with new peer-reviewed research. Scientific panels around the world have reviewed, and continue to review, the complete body of evidence and none report serious concerns about BPA. Instead, they affirm findings of a very low risk. Accordingly, regulatory bodies around the world have determined that the benefits of using BPA to protect our food and perform other functions outweigh any risks.

In the United States, the regulatory body in charge of BPA is the U.S. Food and Drug Administration (FDA). After a review of all the studies on the topic, the FDA released a 2008 draft risk assessment that concluded: "An adequate margin of safety exists for BPA at current levels of exposure from food contact uses." On its website the FDA notes:

> Based on our ongoing review, we believe there is a large body of evidence that indicates that FDA-regulated products containing BPA currently on the market are safe and that exposure levels to BPA from food contact materials, including for infants and children, are below those that may cause health effects….This position is consistent with two risk assessments for BPA conducted by the European Food Safety Authority (EFSA) Scientific Panel on Food Additives, Flavourings, Processing Aids and Materials in Contact with Food and the Japanese National Institute of Advanced Industrial Science and Technology. Each of these documents considered the question of a possible low-dose effect and concluded that no current health risk exists for BPA at the current exposure level."[33]

There has been some controversy regarding this FDA assessment with environmental activists maintaining that the agency relied solely on industry studies to draw its conclusions. In reality, the agency simply excluded studies that did not meet rigorous scientific standards as have other scientific review panels. The excluded studies suffered from serious defects, which limited their value in the assessment. The agency's outside peer review board offered some criticisms on such exclusions. The FDA responded to those criticisms and is continuing its assessment, which is expected in the near future.[34] The FDA has little scientific basis for reversing its position because it is consistent with many other scientific reviews around the world. These include:

- ***The European Union Risk Assessment.*** The EU's risk assessment in 2006[35] found no compelling evidence of BPA-related health effects at estimated human exposure levels. In July 2008 and again in September 2010, the European Food Safety Authority reaffirmed the 2006 review.[36]

- ***National Institute of Advanced Industrial Science and Technology (Japan).*** This extensive study of the issue found that "the risks posed by BPA were below the levels of concern, it will be unnecessary to prohibit or restrict the use of BPA at this time."[37]

- ***U.S. National Toxicology Program (NTP).*** This review found no direct evidence of any problems among humans. It expressed minimal to negligible concern for almost all factors. It called for more research in one area and expressed only "some concern" (more significant findings would state "concern" or "serious concern") because rodent studies showed some association of potential effects on behavior. Yet as the NTP report noted: "These studies in laboratory animals provide only limited evidence for adverse effects on development and more research is needed to better understand their implications for human health."[38]

- ***Health Canada.*** After its review of the science, Canada's public health agency determined: "Based on the overall weight of evidence, Health Canada's Food Directorate has concluded that the current dietary exposure to BPA through food packaging uses is not expected to pose a health risk to the general population, including newborns and young children."[39]

- ***World Health Organization (WHO).*** In November 2010, the WHO released a report on BPA and public health. It found no compelling evidence that BPA posed health risks at current exposure levels from food packaging.[40] The report stated: "[A]t present, there appears to be no single replacement for BPA for all food contact applications. Furthermore, data on the safety of some of these replacement materials are limited or non-existent."[41]

  Potential Consequences of BPA Bans. Lawmakers often support bans based on unscientific misinformation. Worse, they rarely consider the potential unintended consequences. Placing onerous restrictions on the use of BPA would place all of its benefits—recyclability, reusability, energy efficiency, and durability for protection of food and consumer products—at risk. Likely substitutes may be more expensive, not work as well, and produce new risks.

  For example, bans may compromise food safety by eliminating BPA resins used to protect the integrity of canned foods. In addition, policies that force the food industry to switch to glass would prove problematic. BPA has replaced glass containers in many cases, including glass baby bottles, because plastics are less expensive and lighter and eliminate the hazards associated with glass breakage. Children are at a greater risk from broken glass than they are from BPA, particularly if they are given glass baby bottles. FDA notes that parents who are concerned about BPA risks—risks which the agency says are not a concern—can turn to glass bottles if they wish.[42] But anyone who has ever seen a baby toss a bottle on the floor should be well aware of potential dangers, particularly if small pieces of glass are accidentally not picked up in areas where children crawl.

  BPA's use in medical products is also threatened. In 2008, Rep. Rosa DeLauro (D-Conn.) called on the FDA to review that issue while Congress began to look into regulatory measures on BPA. She remarked in a letter to the FDA: "The potential risks posed to patients by BPA leaching from medical devices, especially implantable ones, would be very significant….I strongly urge you to expand your request, and have the Science Board also assess the safety of BPA in medical devices."[43]

  Other plastic products might provide some alternatives, but unfortunately, many of those are under attack by the same groups targeting plastics and resins made with BPA. For example, activists also have specious campaigns to ban polyvinyl chloride plastic (PVC) products used for hospital tubing, blood bags, and other things for which they allege a host of unsubstantiated problems.[44] Even where adequate substitutes exist, they are often more expensive, which simply makes it harder for families to meet basic needs associated with putting food on the table.

Such anti-technology, environmentalist crusades already have had an impact on medicine. For example, *New York Times* science writer Gina Kolata reported in 2002 how a crusade against mercury led hospitals to rely on less effective blood pressure equipment that did not contain mercury. Resulting misdiagnoses from the replacement products have led to inappropriate administration of medications that produced a stroke for one patient and other health problems for other patients.[45]

Elimination of BPA in food packaging poses serious problems because there are not good alternatives for these uses. Packaging manufactures have been trying to remove BPA from their products because of public pressure, but they are having a very difficult time finding safer alternatives. One industry representative told *The Washington Post*, "We don't have a safe, effective alternative, and that's an unhappy place to be … No one wants to talk about that."[46]

Political pressures should not lead to the removal of BPA products without a complete understanding of the value BPA brings and the serious risks associated with arbitrarily removing valuable medical tools. Lawmakers should seriously consider whether the alternative products will be safer. Are we willing to risk more children and adults suffering from E-coli or getting cut from broken glass? Supposedly, some of the state-level legislation addresses that issue by demanding that manufactures replace BPA products with less toxic, safer alternatives. But you cannot mandate something that might not exist. Such laws will simply force manufacturers to use inferior, more expensive packaging and then cross their fingers with the hope that doesn't result in increased food-borne contamination.

Conclusion. BPA bans will do little for public health, since they do not address significant risks. They are part of an ever-expanding arbitrary regulatory state that places many valuable products and freedoms at risk. The fact that some states and localities and even Congress are considering proposals to ban all BPA use in cans and other food and beverage containers illustrates this dangerous progression. First, they claim they are trying to protect the children, but then they end up controlling *everyone*'s access to a wide array of applications and products.

Notes

[1] For details see section in this paper on exposure.
[2] An Act Concerning Banning Bisphenol-A in Children's products and Food Products, State of Connecticut, Public Act No. 09-103, http://www.cga.ct.gov/2009/ACT/Pa/pdf/2009PA-00103-R00HB-06572-PA.pdf.
[3] Assembly Bill No. 1319, California legislature—2011–12, Regular Session, February 18, 2011, Anhttp://www.leginfo.ca.gov/pub/11-12/bill/asm/ab_1301-1350/ab_1319_bill_20110218_introduced.pdf.
[4] House bill No. 728, First Regular Session, Missouri 96TH General Assembly, http://www.house.mo.gov/billtracking/bills111/billpdf/intro/HB0728I.PDF.
[5] Substitute Bill No. 915, "An Act Concerning the Chemical Innovations Institute at the University of Connecticut and the Prohibition on Bisphenol-A in Infant Formula and Baby Food Containers, Jars and Cans," Connecticut General Assembly, January Session, 2011, ftp://ftp.cga.ct.gov/2011/TOB/S/2011SB-00915-R01-SB.htm.

[6] Senate Bill 695, 76th Oregon Legislative Assembly, 2011 Regular Session, http://www.leg.state.or.us/11reg/measpdf/sb0600.dir/sb0695.a.pdf.
[7] Health Canada, "Government of Canada Protects Families With Bisphenol A Regulations," News Release, October 17, 2008, http://www.hc-sc.gc.ca/ahc-asc/media/nr-cp/_2008/2008_167-eng.php.
[8] "Canada to Ban Bisphenol A in Baby Bottles; U.S. Urged to Follow," January 7, 2010, http://www.nbcchicago.com/news/green/Canada_to_Ban_Bisphenol_A_in_Baby_Bottles__U_S__Urged_to_Follow.html#ixzz1K0PedVKt.
[9] Douglas G. Powell, "Medical Applications of Polycarbonate," *Medical Plastics and Biomaterials Magazine*, September 1998, http://www.devicelink.com/mpb/archive/98/09/003.html.
[10] For example, see: Norm Bonenfant, "Cellular Polycarbonate Glazing," Green Building Solutions.org, http://greenbuildingsolutions.net/s_greenbuilding/doc.asp?CID=2174&DID=9101&dowhat=&css=print.
[11] House Democrats (Washington State), press release, "Washington Lawmakers Take Action to Protect the Environment, House Passes Legislation to Care for Everything from State's Infants to Waterways," March 5, 2009, http://housedemocrats.wa.gov/news/20090305_EnviroPackage.asp.
[12] See entry for *2,2-Bis(4-hydroxyphenyl)propane* (which is BPA) in Commission Directive 2004/19/EC of 1 March 2004 amending Directive 2002/72/EC relating to plastic materials and articles intended to come into contact with foodstuffs, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:071:0008:0021:EN:PDF.
[13] Opinion of the Scientific Panel on Food Additives, Flavourings, Processing Aids and Materials in Contact with Food on a request from the Commission related to 2,2-BIS(4-HYDROXYPHENYL)PROPANE (Bisphenol A), Question number EFSA-Q-2005-100; Adopted on 29 November 2006, http://www.efsa.europa.eu/en/efsajournal/doc/428.pdf
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