



AMERICAN COUNCIL ON SCIENCE AND HEALTH

"Our Stolen Future" Ten Years Later

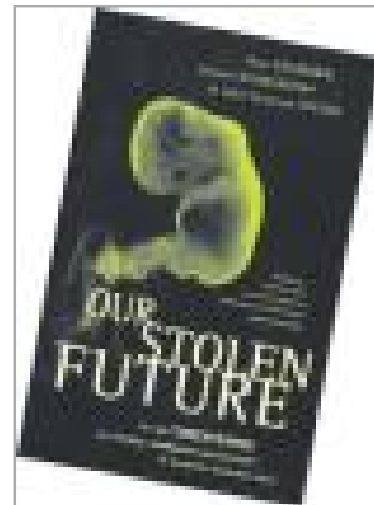
By William M. London, Ed.D., M.P.H.

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Ten years have elapsed since the 1996 publication of *Our Stolen Future* (see [the report ACSH did on the book at the time](#)), in which Theo Colborn, Dianne Dumanoski, and John Peterson Myers presented their "scientific detective story," sounding the alarm about manmade chemicals in the environment that mimic natural hormones and "may be invisibly undermining the human future." Yet the supposed threats suggested by the authors to "the integrity and survival of our species" remain invisible.



In 1999, National Academies Press published a review on the topic by the National Research Council's Committee on Hormonally Active Agents (HAAs) in the Environment. They examined the "ominous prospect of 'estrogen mimics' threatening health and well-being, from the level of ecosystems and populations to individual people and animals." The key point from the executive summary was: "Although it is clear that exposures to HAAs at high concentrations can affect wildlife and human health, the extent of harm caused by exposure to these compounds in concentrations that are common in the environment is debated."

Situation in General: Not So Bad

Al Gore, who wrote the foreword to *Our Stolen Future* and who, in his own words, "used to be the next President of the United States," is the star of a new documentary film, *An Inconvenient Truth*, in which he lectures about future environmental catastrophe. Ten years after the publication of *Our Stolen Future*, Gore's lecture is not about hormone-mimicking chemicals, but on global climate change.

Despite the debatable, hypothetical threats from so-called endocrine disrupting chemicals and the clearly visible, all-too-real threats to our future such as terrorism, genocidal violence, emerging virulent infections, volcanic eruptions, earthquakes, tsunamis, hurricanes, and floods, it is important to note that it looks like our species will be around long enough to experience or avert Gore's worst-case global climate scenarios.

Instead of the future of our species being lost, the health of Americans continues to improve. Life expectancy at birth and at age sixty-five is increasing ([Health, United States, 2005. National Center for Health Statistics. DHHS Publication 2005-1232. November 2005](#)). The age-adjusted death rate from heart disease, the leading killer of the United States, continues to decline substantially. The age-adjusted death rate for all cancer sites combined has also decreased from 1993 to 2002, and, in 2003, the number of deaths due to cancer was less than in the previous year, the first time that such a decline was recorded since national record-keeping was instituted in 1930.

Cigarette smoking, excessive eating, physical inactivity, excess alcohol consumption, microbial agents, motor vehicle injuries, firearm injuries, and illicit drugs remain well established as the leading modifiable causes of death. Our exposures to toxic agents (including particulate matter in polluted air, indoor air pollution, environmental tobacco smoke, lead in drinking water, and occupational exposures such as coal dust and asbestos) also add to the burden of

mortality and morbidity in the United States, but the overall impact of these exposures are still difficult to estimate based on available evidence (Mokdad AH et al. Actual causes of death in the United States, 2000. JAMA, 2004;291:1238-45. Correction at JAMA, 2005;293:293-4).

In a new report on the global burden of disease published in the May 27 issue of *The Lancet*, an international team of researchers found that from 1990 to 2001, “substantial gains in health have been achieved in most populations” with “a 20% reduction in global disease burden per head due to communicable, maternal, perinatal, and nutritional conditions between 1990 and 2001” (Lopez A. et al. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet* 2006; 367:1747-1757). Death rates among adults have decreased, but the researchers noted that injuries remain a disproportionately important cause of death among fifteen- to fifty-nine-year-olds. The report indicated that in low- and middle-income countries, the biggest threats to health are risk factors prevalent among the poor such as child underweight for age, unsafe water, lack of sanitation, lack of hygiene, indoor smoke from household use of solid fuels, and unsafe sex, plus risk factors for non-communicable diseases and injuries, such as high blood pressure, smoking, and alcohol use.

The researchers found that mortality declined for children up to age four years by 30% in all regions of the world. They attributed more than half of the deaths from children from five acute respiratory infections, measles, diarrhea, malaria, and HIV/AIDS, with death rates increasing only for HIV/AIDS and malaria.

Weighing Real Threats Against Hypothetical Ones

An effective weapon against malaria happens to be one of the alleged future-stealers in *Our Stolen Future*. The pesticide DDT became a ubiquitous pollutant due to large-scale uses in agriculture and was banned in 1972 by the U. S. Environmental Protection Agency because of data indicating toxicity to fish and birds -- but it can be safely applied to the interior mud walls of buildings to cost-effectively repel and kill the Anopheles mosquitoes that bite people and transmit malaria parasites. However, some environmental alarmists continue to campaign against DDT. And rules and regulations under the Stockholm Convention on Persistent Organic Pollutants regarding the trade, storage, and use of DDT make the use of DDT more difficult and expensive.

Meanwhile, the authors of *Our Stolen Future* continue to emphasize and speculate about metaphorical crimes committed by synthetic, hormonally active, widely distributed, environmental contaminants they call “endocrine disruptors” -- the culprits of their so-called “scientific detective story,” which unlike most detective stories, started with the culprits and searched for crimes. The authors now have a website -- <http://www.ourstolenfuture.org> -- produced by Myers. The website fails to place the authors’ speculations about contaminant hazards in perspective, while making even more alarming proclamations about synthetic “endocrine disruptors” than they made in their book. For example, the site includes the following statement:

Traditional toxicology often assumes that there is some level of exposure, a threshold, beneath which small amounts of a contaminant have no effect. New research has demonstrated that endocrine disrupting compounds violate this assumption, that there is **literally no threshold of effect for an endocrine disrupting compound** when it is added to a hormone system that is already active. [emphasis and hyperlink in original at <http://www.ourstolenfuture.org/Basics/challenge.htm>]

Endocrine disrupting chemicals violate a basic assumption of toxicology and modern risk assessment. For classic toxicants, “the dose makes the poison.” As the dose increases so too does the effect. Dose-response is understood as a linear relationship. For some endocrine disrupting chemicals, however, effects may disappear at higher levels, or become different qualitatively, and may appear at levels below the no observable adverse effect level, or NOAEL.” [emphasis and hyperlink in original at <http://www.ourstolenfuture.org/Basics/challenge.htm>]

Are we supposed to be concerned about effects that occur at the no observable effect level? Do they mean non-observable effects? If effects are non-observable, how do we know they take place? Could a qualitative difference

mean a favorable effect?

The message is even more alarming on the “Nine Key Points” page of ourstolenfuture.org. For example, key point 4:

It's not just the disruption of the endocrine system. Natural chemical signals are important at all levels of organization of life -- within cells, among cells, between organs, even between organisms, including from one species to another. Any of these chemical signals, in principle, are vulnerable to disruption. Scientists, for example, have just begun to look at the chemical signals that mediate communication between symbiotic organisms, such as nitrogen-fixing bacteria and the roots of the plants in which they live, and are examining how synthetic chemicals might interfere with these signals. Disrupting these “signals of life” could have important ecosystem impacts. [<http://www.ourstolenfuture.org/Basics/keypoints.htm>]

Note that the qualifiers “might” and “could” also imply “might not.” The “Bottom Line” page on the site concludes:

If you have read this section, you will find it replete with all sorts of cautionary statements, with many comments to the effect that data on one issue or another are as yet inadequate to reach a judgement. In sum, however, **the weight of the evidence says we have a problem**. Human impacts beyond isolated cases are already demonstrable. They involve impairments to reproduction, alterations in behavior, diminishment of intellectual capacity, and erosion in the ability to resist disease. The simple truth is that the way we allow chemicals to be used in society today means we are performing a vast experiment, not in the lab, but in the real world, not just on wildlife but on people. [emphasis in the original -- <http://www.ourstolenfuture.org/Basics/bottomline.htm> viewed 5/16/06]

It would seem that the authors are requesting that readers pay more attention to their conclusion and to disregard “all sorts of cautionary statements.” And what the weight of evidence says to scientists depends in part on what evidence they choose to weigh. Some evidence may lead to a less gloomy conclusion.

Our Stolen Sperm?

Perhaps the extent of impairments to reproduction is not quite as alarming as portrayed at ourstolenfuture.org. According to the “2005 World Population Data Sheet of the Population Reference Bureau” (http://www.prb.org/pdf05/05WorldDataSheet_Eng.pdf):

In many industrialized countries and some developing countries such as China and Thailand, average fertility is now well below the two-child average. Because these low fertility levels lead to population decline sooner or later, some reports have sounded alarms about the possibility of a worldwide “birth dearth.” The majority of the world's countries, however, have fertility above the two-child average and large numbers of women of reproductive age due to higher fertility in the past. Thus, global population growth is ensured for many decades. [p. 1]

The data sheet also notes: “Some stories in the popular media suggest that world population growth has stopped -- but world population is still increasing at 1.2 percent per year, resulting in an additional 80 million people annually” (p. 15).

Much of *Our Stolen Future* is devoted to evidence that sperm counts are decreasing and the authors' speculations linking decreased sperm counts to exposure to trace levels of endocrine disruptors. The authors wrote: “The most dramatic and troubling sign that hormone disruptors may already have taken a major toll comes from reports that human male sperm counts have plummeted over the past half century, a blink of the eye in the history of the human species” (p. 172). The authors cited a study by Carlsen and others published in 1992. Later they wrote: “As the list of hormone-disrupting chemicals continues to expand, each new addition argues against the likelihood that male sperm count levels will fully recover in the years ahead” (p. 234).

In the Foreword, Al Gore expressed a similar concern: “Although scientists are just beginning to explore the implications of this research, initial animal and human studies link these chemicals to myriad effects, including low sperm counts” (p. vi). But just as Gore has reason to be skeptical about vote-count data, he has reason to be skeptical about sperm-count data. A critical review of the literature concluded that there is no worrisome trend from which sperm count levels need to recover:

Our results, which contradict recent reports, reinforce the idea that any definitive claims regarding trends in sperm concentrations must be viewed critically. When including all available data and accounting for geographic differences in sperm concentrations, one cannot conclude that sperm counts are declining in the U. S. [Saidi J. et al. Declining sperm counts in the United States. A critical review. J Urol. 1999;161:460-462. See <http://www.malebiologicalclock.com/docs/Declining%20Sperm%20Counts%20in%20the%20US-A%20Critical%20Review.pdf>]

Although *Our Stolen Future* offered some reassurances about the threat to fertility stemming from concerns about falling sperm counts, they were careful to make sure that readers were alarmed in the process:

There is always a temptation to extrapolate worrisome trends into apocalyptic, worst-case scenarios, but it is hard to imagine that sperm counts will fall inexorably downward and reach a point that poses an imminent threat to human survival. Even so, humans do appear to be gambling with their ability to reproduce over the long term, which should be of grave concern. [p. 234]

On ourstolenfuture.org, the page devoted to “The science of sperm count declines” still raises concerns, though much more defensively and with a focus on the Carlsen report: “Industry scientists set out to undermine the validity of the Carlsen report, seizing upon many virtually unavoidable difficulties in retrospective studies of something as difficult to measure in an unbiased way as human sperm density” (<http://www.ourstolenfuture.org/NewScience/reproduction/sperm/sperm.htm#>). But if the study had virtually unavoidable difficulties, why did the authors include in *Our Stolen Future* a description of plummeting sperm counts as “the most dramatic troubling sign” implicating hormone disruption?

False Alarms and Endless Fears

After the publication of the initial edition of *Our Stolen Future*, a paper was published that raised concerns about various estrogen mimics acting in combination to produce dramatically greater effects. The paper was mentioned in the second edition of *Our Stolen Future*. However, it turned out to be a false alarm. On October 15, 2001, the Office of Research Integrity (ORI) and the Assistant Secretary of Health of the U.S. Department of Health and Human Services announced:

Based on the report of an investigation conducted by Tulane University, dated July 16, 1999, and additional analysis conducted by ORI in its oversight review, the U.S. Public Health Service (PHS) found that Dr. Arnold, former Research Assistant Professor at the Center for Bioenvironmental Research at Tulane University Medical Center, engaged in scientific misconduct. Dr. Arnold committed scientific misconduct by intentionally falsifying the research results reported in Table 3 of a paper published in the journal *Science* [footnote: Steven F. Arnold, Diane M. Klotz, Bridgette M. Collins, Peter M. Vonier, Louis J. Guillette, Jr., John A. McLachlan. "Synergistic Activation of Estrogen Receptor with Combinations of Environmental Chemicals." *Science* 272:1489-1492 (June 7, 1996) (hereafter referred to as the "Science paper")] and by providing falsified and fabricated materials to investigating officials at Tulane University in response to a request for original data to support the research results and conclusions reported in the *Science* paper. In addition, PHS finds that there is no original data or other corroborating evidence to support the research results and conclusions reported in the *Science* paper as a whole.

Specifically, PHS finds that Dr. Arnold’s research reported in the *Science* paper involved a finding that environmental chemicals, such as certain insecticides and hydroxylated polychlorinated biphenyls (PCBs),

which have a weak estrogenic activity when acting alone, were up to 1,000 times more potent in mimicking estrogen when tested in combination. These research results and conclusions were important to the public health because they suggested that the Environmental Protection Agency (EPA) may need to adjust its guidelines on exposure limits to such chemicals. The Science paper was withdrawn on July 25, 1997. See Science 277:462 (July 25, 1997). [<http://grants.nih.gov/grants/guide/notice-files/NOT-OD-02-003.html>]

While acknowledging that Dr. Arnold committed scientific fraud, ourstolenfuture.org insists that synergism among endocrine disruption is well established, though not with the incredible potency that the Arnold paper suggested. A 1999 "Overview of the Endocrine Disruption Issue" published by the Royal Society of Chemistry as part of its "Issues in Environmental Science and Technology" series provided a more reassuring message about the exposure to multiple environmental endocrine disruptors (EDs): "Current experimental data suggest additive interactions do occur between EDs, but the issue of interactive effects, and synergism in particular, will undoubtedly remain a topic of intense debate for some time to come" (p. 21) (http://www.rsc.org/images/is012001_tcm18-27576.pdf).

Scientists will continue to debate how risky our exposures to synthetic endocrine disrupting chemicals are. Ourstolenfuture.org emphasizes that the persistence in our bodies of the synthetic endocrine disruptors to which we are exposed makes these hormone mimics a special concern. Other scientists, including ACSH Advisor Stephen Safe, D.Phil, a distinguished professor and director of the Center for Environmental and Genetic Medicine at Texas A&M University System Health Science Center, have argued that our exposure to synthetic endocrine disruptors is small compared to our repeated exposure in our diets to naturally occurring, plant-based chemicals with estrogenic activity (see http://www.policynetwork.net/uploaded/pdf/Env&Health_ch_2.pdf). In the meantime, if we are to protect our futures from being stolen, we are likely to be most successful by continuing to emphasize the importance of addressing what are clearly the greatest hazards to our health rather than invisible, speculative hazards such as the endocrine disruptors about which the authors of *Our Stolen Future* continue to promote their grave, qualified concerns.

William M. London, Ed.D., M.P.H. is associate professor and chair of the Department of General Studies and interim director of the Master of Public Health Program in Urban Public Health at Charles R. Drew University of Medicine and Science in Los Angeles, California, as well as an ACSH Advisor.

See also: ACSH's original [1996 report on *Our Stolen Future*](#).

This information was found online at:

http://www.acsh.org/healthissues/newsID.1345/healthissue_detail.asp