

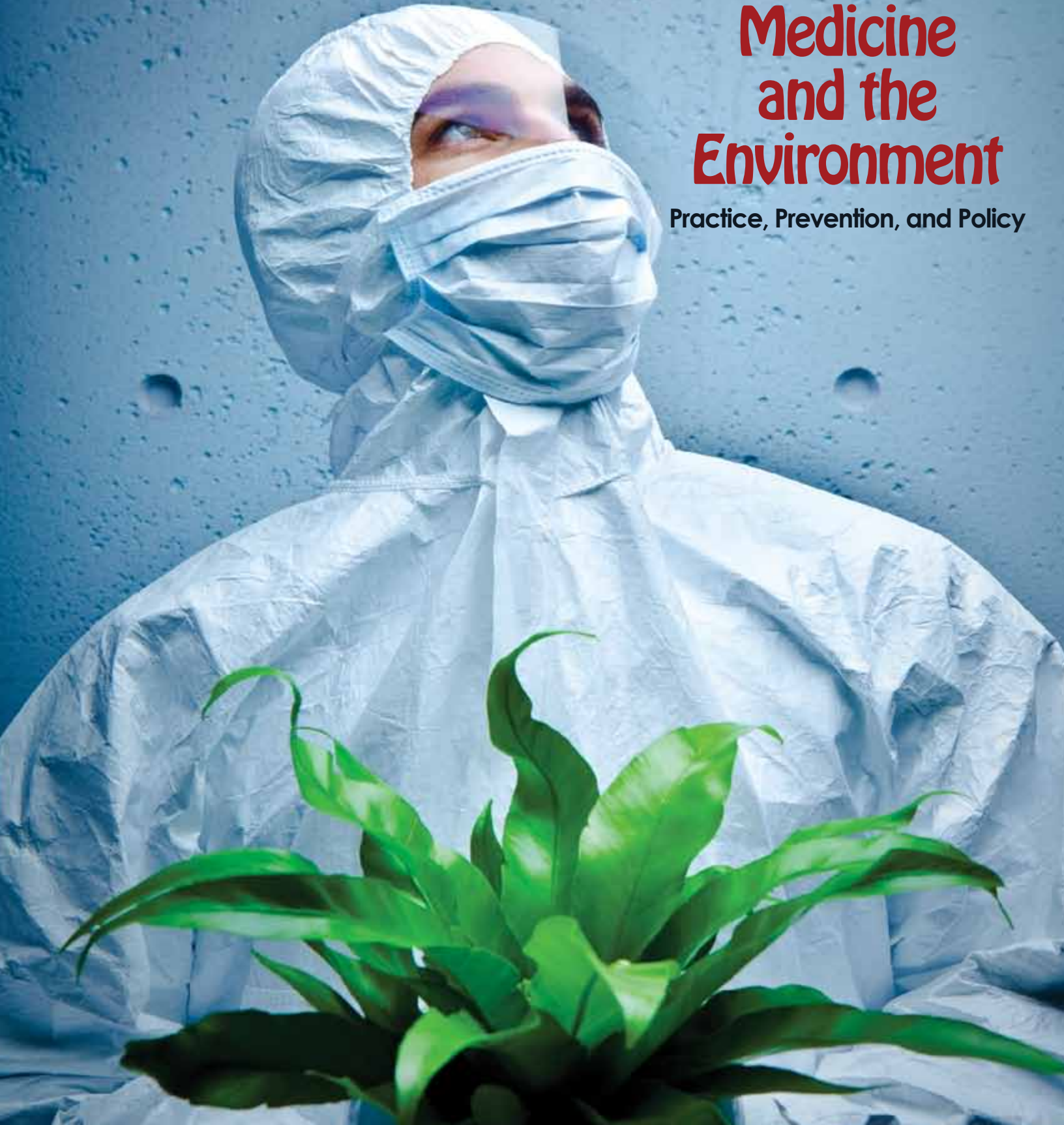
VOL.83 NO.3 April 2010

SAN FRANCISCO MEDICINE

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 1003 A O'Reilly Ave., San Francisco, CA 94129
 Phone: (415) 561-0850 extension 261
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Toxic Matters Brochure on Page 26

It is with great pleasure that we share with you *Toxic Matters*, the UCSF Program on Reproductive Health and the Environment's (PRHE) new print and online publication designed to help people avoid exposure to toxic substances that are present in our daily lives. A pullout version of the brochure is located on page 26.

Toxic Matters is a nontechnical guide that provides evidence-based recommendations for preventing exposure to environmental substances with adverse reproductive and developmental health impacts.

The online version of this brochure, as well as further resources, is available on the program's website, www.prhe.ucsf.edu/prhe/tmlinks.html. If you would like more information on *Toxic Matters*, including information on getting copies for groups, seminars, clinics, etc., please e-mail prhe@obgyn.ucsf.edu or visit the website at www.prhe.ucsf.edu.

April 2010

Volume 83, Number 3

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A SAMPLING OF ACTIVITIES AND ACTIONS OF INTEREST TO SFMS MEMBERS

Join the Fight to Protect Medicine CMA's 36th Annual Legislative Leadership Conference

CMA Legislative Day 2010 is scheduled for **Tuesday, April 27, 2010**, at the Sheraton Grand Hotel in Sacramento (please note the new date).

At the conference, you will hear about the issues facing medicine in California from an impressive array of experts who live and breathe the politics and policy on these issues. Armed with this knowledge, you will then head to the Capitol to meet with legislators to make sure the voice of doctors is heard in Sacramento. Will you join us?

The 2010 Conference will feature the new Speaker of the Assembly, John Perez, who will discuss the latest political happenings in the Capitol, and Robert Hertzberg, Speaker Emeritus of the Assembly, who will give insight on proposed structural reforms to our state government. Learn about the 2010 budget and its effect on health care from key officials who put the budget together. Get the latest from CMA's Center for Government Relations on legislation and how it will affect physicians. Meet directly with your legislators or their staff on issues that affect your practice and your patients. You will be provided with talking points and other resources to allow for a successful visit.

Please bring your white coat.

Contact Therese Porter in the Membership Department to RSVP, at tporter@sfms.org or (415) 561-0850 extension 268 for information about appointments with our legislators.

SFMS Past-President Edward Chow Reappointed to Health Commission

Edward A. Chow, MD, has been reappointed to an unprecedented sixth term on the San Francisco Health Commission, the governing and policy-making body

of the Department of Public Health. Dr. Chow has been president of the Commission and will now serve as vice president. Commissioner Chow is an internist and the executive director of the Chinese Community Health Care Association. The SFMS is again pleased and proud to have someone of Dr. Chow's knowledge and distinction so intimately involved with health services in San Francisco. He is currently the only physician on the Commission.

2010 SFMS Seminar Schedule

In conjunction with Practice and Liability Consultants

Contact Posi Lyon at plyon@sfms.org or (415) 561-0850 extension 260 for more information or to register. Advance registration is required.

Tuesday, May 11, 2010

Customer Service/Front Office Telephone Techniques/Difficult Patients Skills

This half-day practice management seminar provides valuable training to enable your staff to handle front desk tasks and patients both efficiently and professionally. Physicians and managers should not assume their staff members inherently have customer service/patient relations skills. This seminar gives them the tools for positive patient relations that enhance the practice.

9:00 a.m.–12:00 p.m. (8:40 a.m. registration/continental breakfast) \$95 for SFMS/CMA members and their staff (\$85 each for additional attendees from the same office); \$150 each for nonmembers.

Tell Us Why You Are a Member!

SFMS is launching a new member-driven promotional campaign and needs your help. The campaign, entitled "Why I'm a Member," will draw exclusively upon quotes from members about their experiences with SFMS. To help get this

campaign off the ground, we are asking you to share memorable moments, stories, and anecdotes that exemplify why you are a member of SFMS. Please keep all submissions under 200 words. We will be including these in the *Membership Directory*, in *San Francisco Medicine*, and on the website. E-mail submissions or questions to Jonathan Kyle, jkyle@sfms.org.

We thank you for your participation and look forward to hearing from you

Stay Informed and Help SFMS Go Green!

Make sure SFMS has your e-mail address (SFMS does not share its members' e-mail addresses). You can add this information to your membership profile by going to the Member Log-in section of the website at www.sfms.org, by contacting the Membership Department at (415) 561-0850 extension 268, or by e-mailing tporter@sfms.org.

Watch Your Mailboxes!

The 2010–2011 SFMS *Membership Directory and Physician Desk Reference* will be going out in late May. This important resource is a benefit of membership and is free to active SFMS members.

Dedication

This issue of *San Francisco Medicine*, appropriately focused on environmental health issues, is dedicated to the memory and legacy of Edgar Wayburn, MD, former president of the SFMS and Sierra Club as well as a former editor of this journal. He died in March at the age of 103 and leaves what the *San Francisco Chronicle* rightly calls "a towering legacy." See his full obituary on page 38.

Space for Rent

ON-CAMPUS medical space at St. Mary's (650) 282-4620 or tleonard@baysiderp.com.

The San Francisco Medical Society Advocating for Physicians and Patients

As San Francisco Medical Society members know, since its inception in 1868 SFMS has been an activist organization when it comes to the health of our community. Many projects and activities that have begun in San Francisco have gone on to have implications for the state and the nation. Here are some highlights from the current SFMS community health agenda.

Agenda for 2010

- Preserving the safety net and public health programs in times of severe budget cuts.
- Testifying in support of antitobacco legislation and San Francisco's law banning the sale of tobacco in pharmacies. With the California Medical Association, submitting amicus brief opposing lawsuit to overturn the ban.
- Working with Mayoral Task Force to develop and support the Healthy San Francisco program and participating in the lawsuit to preserve the program.
- Providing physicians for medical consultation for the San Francisco Unified School District.
- Participating in the Hep B Free program in San Francisco and educating physicians and patients on prevention and treatment of hepatitis B.

SFMS Community Health Activities

UNIVERSAL ACCESS TO CARE: SFMS leaders have long advocated that every San Franciscan should have access to quality medical care, and our representatives served on the Mayoral Task Force that designed the Healthy San Francisco program. SFMS joined in the lawsuits to preserve that program as well. SFMS members advocated for, and even created, community clinics dating back to the original Haight-Ashbury Free Clinics in the 1960s.

ANTI-TOBACCO ADVOCACY: SFMS advocates were in leadership roles in the banning of tobacco smoking in San Francisco restaurants, ahead of the rest of the state and nation; we advocate for ever-stronger protections from secondhand smoke, for removal of tobacco products from pharmacy settings, for higher taxes on tobacco products, and more. SFMS signed onto an amicus brief in support of upholding San Francisco's law banning the sale of tobacco in pharmacies.

HIV PREVENTION AND TREATMENT: The SFMS was at the center of medical advocacy for solid responses to the AIDS epidemic, being among the first to push for legalized syringe exchange programs, appropriate tracking and reporting, optimal funding, and more.

SCHOOLS AND TEEN HEALTH: SFMS helped establish and staff a citywide school health education and condom program, removed questionable drug education efforts from high schools, and worked on improving school nutritional standards; it provides ongoing medical consultation to the SFUSD school health service. In addition, SFMS has authored a resolution allowing minors to receive vaccines to prevent STIs without parental consent.

ENVIRONMENTAL HEALTH: SFMS's many environmental health efforts include establishing a nationwide educational network on scientific approaches to environmental factors in human health and advocating for the reduction of mercury, lead, and air pollution exposures.

REPRODUCTIVE HEALTH AND RIGHTS: SFMS has been a state and national leader in advocating for women's reproductive health and choice, including access to all medical-indicated services.

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Mary Lou Licwinko, JD, MHSA



Reform: The Medical View

On March 21, the United States Congress passed a historic health care reform bill. The SFMS and CMA worked diligently to help craft the legislation to best serve the interests of physicians and their patients. There were several important provisions added or deleted from the bill because of SFMS/CMA efforts, but there is still work to be done. The day following the bill's passage, CMA President Brennan Cassidy, MD, sent the following letter to all members of the CMA, summing up the current position of CMA on the bill:

Yesterday a historic Congressional vote was taken. Regardless of your political persuasion or whether you supported or opposed the health care reform legislation just enacted by Congress, we should all acknowledge the significance of this moment for our patients. Health care will go through major changes as a result of this legislation and we have a significant obligation to be vigilant and ensure that its implementation really works for our patients. As your president, I can assure you that my fellow officers and I, and your CMA trustees, have set aside our personal politics to advocate for you and your patients.

CMA fought for and gained some significant improvements in the final health care reform bill but obviously fell short on some of our policy goals. We expanded coverage for more than 5 million Californians, ended some insurance company abuses, and provided substantial increases for primary care and rural surgeons in Medicare and Medicaid. We will be relentless in our fight to complete our unfinished business. Congress must act

immediately to eliminate the Medicare SGR formula, update the payment localities (GPCI), overturn the Independent Medicare Board, and improve the quality reporting programs in follow-up legislation this year.

We will continue that fight as we shift to the implementation phase of health care reform. There is much to be done before this bill goes into effect. The success of health care reform will ultimately be measured by the actions of the federal regulators tasked with interpreting and implementing the legislation. The legislative and regulatory implementation of this bill will be a lengthy and difficult process. CMA will continue to be involved in every aspect.

Once again, I urge all of us to set aside our personal political views. If we dwell on the past or shake our heads in disappointment that the bill failed to do everything we wanted, we will fail to take advantage of this moment. We will have failed our patients and our fellow physicians who need us to assure them that we will keep advocating on their behalf. We cannot allow ourselves to be overwhelmed by the uncertainty of change, but rather we must lead because it is our responsibility as physicians.

Thank you all for your leadership, your advocacy with your Congressional Representatives, and your continued commitment to CMA.

Sincerely, J. Brennan Cassidy, MD
President, California Medical Association

Welcome New Members!

The San Francisco Medical Society would like to welcome the following new members:

- Michael Burns, MD**, Referred by Gerald Gellin, MD
- Vanessa Kenyon, MD**, Referred by Aditi Mandpe, MD
- Michiko Shibata, MD**, Referred by Eric Tabas, MD
- Dennis Song, MD**, University of California Davis, 2004
- Jeanne Tyan, MD**, The Permanente Medical Group
- Thomas Haddad, MD**, Referred by Gary Chan
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Michael Rokeach, MD, and Steve Heilig, MPH



A “Historic Step Forward”?

The United States has often been said to have the best health care system in the world. That may be true for many people, such as those who have health insurance, access to state-of-the-art clinicians, and other services. But, of course, too many have not had such access. Thus our nation's prolonged struggle to increase access to care and to improve the various health indicators, some of which lag far behind other developed nations.

After more than a year of partisan political warfare and rhetoric ranging from high-minded to hateful, Speaker Nancy Pelosi and colleagues sent President Obama the Patient Protection and Affordable Care Act, which had been “resurrected like Lazarus” (in the words of the *New York Times*) from what seemed inevitable legal euthanasia just a short time before. And, surprising nobody, President Obama signed it into law. Thus ended round one of the latest season of “health care reform.”

While it might surprise some to see this as only round one, the numerous legal, procedural, and practical challenges already underway force us to continue to advise that we must not hold our collective breath when it comes to seeing real results soon. But some significant changes are likely to survive the challenges, and most of these might be quite positive.

This is why mainstream or even “conservative” groups like the AMA, Consumers Union, and AARP endorsed this legislative package.

The primary intent of the law is to provide for coverage to more than 30 million uninsured Americans by 2019, using both private and public insurance. In the lengthy political process, a much-debated “public option” was an early casualty. Hospitals, the pharmaceutical industry, and—to a lesser extent—health insurers all gained concessions to make the legislation more palatable to their bottom lines. Testy topics such as coverage for illegal immigrants and abortion funding saw compromises that will satisfy few—and might yet be “corrected.” For physicians, numerous improvements were also achieved, including administrative simplification for “Physician Billing in Private Sector” requirements, encouraging MICRA-type tort reform, financial incentives for primary care, and more.

The AMA, which gave the legislation “qualified support,” issued this statement from AMA President J. James Rohack, MD: “Historic passage of health system reform by the U.S. House of Representatives is an important step toward providing coverage

to all Americans and improving our nation's health system. Every day physicians see the devastating effect being uninsured has on the health of patients. Physicians dedicate their lives to helping patients, and we have an historic opportunity now to do just that.


“While the House-passed bill isn't perfect, we cannot let the perfect be the enemy of the good when it comes to something as important as the health of Americans.”

The California Medical Association has provided a more detailed summary of the legislation. For patients who are concerned, CMA notes, “If you like your insurance, you can keep it; grandfathers in all existing coverage, including health savings accounts.”

The “Insurance Industry Reforms” bear printing here almost in full: requires health plans to spend 85 percent of revenue on direct patient care versus profit and overhead; requires adequate provider networks; requires plans to publicly disclose information on claims payment policies, enrollment, denials, rating practices, out of network cost-sharing, and enrollee rights; prohibits plans from denying coverage for pre-existing conditions; prohibits plans from rescinding coverage when a patient becomes ill; prohibits plans from setting annual or life-time limits on benefits.

There is much more detail, of course, which cannot be covered here.

The total costs of the new package are still unclear and will depend on many future factors. But the evidence-based impetus for all this effort is that access to care is a powerful factor in quality and length of life. Also, most everyone agrees that the health insurance industry has long been in need of corrective regulation. Beyond that, controversy will continue, and how it all plays out still remains to be seen. But as no “death panels” are in sight, and no real government takeover or “socialism” seems discernable in the legislation, it is doubly shameful how nasty the public debate became, over proposals that even polls showed most Americans favored. But such is democracy, the worst political system other than all the alternatives.

All of us should at least be hopeful that the benefits of these reforms will outweigh the costs—to the whole system but especially for patients, which really means all of us. If so, our nation might actually move closer to truly having the best health care system in the world, one with more Americans having full access to care within it. 

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Philip R. Lee, MD; Steve Heilig, MPH; and Michael Lerner, PhD

Better Living through Chemistry?

Reform is in the air, whether we are talking about health care, banking, or the American political system itself. For Medicine and the Environment, the theme of this issue of *San Francisco Medicine*, this is true as well. Change can be frightening, but it is change that can give us hope—even though, as with health care in general, “reform” can mean many things and can take many years.

In 2002, the SFMS hosted a landmark conference focused on the emerging science of industrial chemicals and their impacts on human health. At that meeting, an international network of scientists, clinicians, patients, environmental advocates, and others was formed. In the eight years since, the Collaborative on Health and the Environment (CHE) has presented international conferences, conference calls featuring leading figures in the field, and much more.

When we take or prescribe most any medication, we assume it has been tested, not only for effectiveness but also for safety. That is one of the primary roles of the U.S. Food and Drug Administration, and it reflects both medical ethics—the Hippocratic dictum “First, do no harm”—and what most educated modern people would see as common sense, as in the more parochial slogan, “Better safe than sorry.”

In another important arena, however, the reverse has been the common approach. With more than 85,000 industrial chemicals registered for use in modern life and thousands more added yearly, very few have been tested before use to make sure they are not hazardous to our health.

Our understanding of links between individual toxicants and diseases varies widely. The well-known examples of lead, mercury, some pesticides, and environmental tobacco smoke, for example, are proven. Recent research on bisphenol A (BPA), a widely used chemical in plastics, has reached the point where mainstream medical organizations now urge its removal from our environment and bodies. At any point along our lifespan, “from womb to tomb,” chemical exposure, even at extremely low levels in some cases, can result in health problems—sooner or later.


In 2008, the American Medical Association called upon the federal government “to implement a comprehensive chemicals policy that is in line with current scientific knowledge on human and environmental health, and that requires a full evaluation

of the health impacts of both newly developed and industrial chemicals now in use.” The AMA also will “encourage the training of medical students, physicians, and other health professionals on the human health effects of toxic chemical exposures.”

In this realm, Europe is leading the U.S. There, scientists and government have worked together to develop new safety and regulatory approaches to chemicals, where applications for use of new chemicals would be evaluated to see if additional testing or restrictions are needed. The new European approach—termed REACH (Registration, Evaluation, and Authorization of Chemicals)—seems reasonable. This is not a fringe or radical movement. Europe’s leading medical associations called for stricter testing and regulation of chemicals. Such mainstream support from the medical profession reflects the ever-growing conviction that improvement is warranted. We should note that this AMA policy originated in part here at the SFMS.

It took more than four decades to get from the United States Surgeon General’s first major report on tobacco in 1964 until FDA regulation was achieved in 2009. As with tobacco, similar scenarios of delay and obstruction have hindered healthy changes in policy regarding proven toxins such as lead, mercury, PCBs, and alcohol. But experience shows what with concerted, sustained attention to scientific evidence, and with action based upon that research, progress is possible.

The modern industrial age has brought incalculable benefits to humans. It has also brought some harms. We can no longer afford, nor should we tolerate, “business as usual” in this regard. With a rational chemical policy in place, we may yet see, without qualification, an era of “better living through chemistry.”

In this edition of *San Francisco Medicine*, we offer perspectives and information from some leading figures in the environmental health field. 

Philip R. Lee is chancellor and professor of medicine (emeritus), University of California, San Francisco; professor emeritus, Stanford University; former United States Assistant Secretary of Health and Human Services; and chairman of CHE. Steve Heilig is on the staff of the San Francisco Medical Society and the Collaborative on Health and the Environment and is coeditor of the Cambridge Quarterly of Healthcare Ethics. Michael Lerner is president of Commonweal and vice chair of the Collaborative on Health and the Environment. For more on CHE, see www.healthandenvironment.org.

A Climate Change for the Better

Federal Initiatives on Climate Change and Health

Linda Birnbaum, PhD, and John Balbus, MD, MPH

With Washington, D.C., buried under more than two feet of snow and Congress seemingly paralyzed by the discussion of health care and economic reforms this winter, one might have been tempted to believe that the human health impacts of climate change have been lost in the blizzard of other federal public health concerns. But instead we can write today about the new and renewed federal efforts to address these broad impacts—efforts taking the form of research and interagency initiatives, which are emerging like the crocuses under the leafless trees. As spring arrives and these initiatives begin to bloom, physicians should be among those taking notice.

The public health community is beginning to fully realize that climate change presents many long-term challenges to human health. The American Medical Association's 2008 resolution on global climate change and human health recognized that immediate effects may include those related to heat, extreme weather events such as flooding or drought, increased air pollution, and infectious and vector-borne diseases. It also noted longer-term impacts on food and water supplies that could result in malnutrition and dehydration.¹ The resolution also included a number of recommendations aimed at encouraging the medical community to become educated about the impacts and threats from climate change, particularly on vulnerable populations such as the elderly, children, and the poor; to help such patients and communities respond; and to become involved in policy efforts to mitigate climate effects.

Exciting new research is revealing

that the news on climate change is not necessarily all bad, and that reducing greenhouse gases has the potential to provide significant benefits to human health, saving both lives and dollars in the process. Last November, scientists and government officials from the United States and Great Britain came together in an "across the pond" teleconference event to mark the release of a special issue of *The Lancet* that contained a series of studies² conducted in London and Delhi demonstrating that significant health benefits could result if measures were taken to reduce greenhouse gases from household energy use, electrical generation, urban land transport, and agriculture.

The key message from the series, which was cosponsored by the National Institute of Environmental Health Sciences, the Wellcome Trust, and the London School of Hygiene and Tropical Health Medicine, was that "[i]f properly chosen, action to combat climate change can, of itself, lead to improvements in health."³ For example, interactions between human health, climate change, and short-lived greenhouse pollutants (those that last only a few weeks at most in the environment) were the topic of one of the papers in *The Lancet* series, which illustrated both the opportunities and the complexities of this science. Black carbon aerosols that result from incomplete fossil fuel combustion in household cooking and diesel engines have been shown in numerous studies to contribute to cardiovascular mortality, asthma, COPD, and pneumonia. Other studies have suggested that black carbon aerosols may contribute as much as 60 percent of the total climate forcing as the most promi-

nent greenhouse gas, carbon dioxide.⁴ Reducing black carbon emissions by providing the developing world with cleaner cookstoves or installing diesel particulate filters would provide the double benefit of improving health while immediately reducing the warming potential of the atmosphere. One caveat, however, is that where there is black carbon, there is often sulfur. Because sulfate aerosols have a cooling effect on the atmosphere, diesel particulate filters that require low-sulfur diesel fuel may provide mixed benefits for climate, since they would reduce both warming and cooling air pollutants. Because of the high stakes for both public health and as the complex considerations of public policy in the climate arena, *The Lancet* authors recommend that policy makers consider all of the health implications in short-lived greenhouse pollutant reduction measures.

Because physicians are at the front lines of treating diseases and reducing mortality that may be associated with a changing climate, it is vital that you contribute your perspectives to these considerations. In addition to revealing new bricks in the path toward understanding climate change impacts on health, this research offers a road map to move not just health but also energy, transportation, and agricultural policy forward on this issue. *The Lancet* authors noted, however, that awareness of the potential for health benefits to offset at least some of the costs of reducing greenhouse gases was generally low. Physicians clearly have a role to play in increasing such awareness.

Other federal commitments to research on health impacts of climate
Continued on page 16...

From Out in the World to Under the Skin

Expressions of Socioeconomic Status

Ted Schettler, MD, MPH

Socioeconomic status (SES) shapes fundamental biologic, psychologic, and physical realities. It is among the strongest determinants of health and health disparities in the U.S. (Adler et al 2010). Lower SES brings together, in various combinations, increased exposures to many kinds of environmental hazards, increased susceptibility, decreased capacity to cope, and reduced capacity to recover. These inescapable truths are relevant daily to clinicians, public health officials, community planners, and other policy makers.

Lower SES increases the risk of leading causes of morbidity and mortality in the U.S., including heart disease, hypertension, diabetes, obesity, dementia, asthma, many kinds of cancer, premature birth, and low birth weight infants. These are not only more common but also often more rapidly progressive in people whose lives include combinations of reduced income and education, inadequate employment, and other measures of lower SES. The relationship between SES and health status exists across the entire socioeconomic spectrum and does not apply only to people living in poverty, although the gradient is not necessarily linear for all measures.

People of lower SES often live in neighborhoods with more environmental stressors. Access to healthy food and recreational facilities is frequently limited. In a self-reinforcing feedback loop, lower SES can worsen the impacts of various environmental stressors. For example, a prospective study found that the risk of developing asthma in children exposed to similar amounts of traffic-related air pollution was greater in children with lower SES (Shankardass 2009). This study also found that maternal smoking during pregnancy

was associated with a large increase in the risk of asthma among participants with low SES but not in high SES subjects.

Another prospective study found that prenatal exposure to secondhand tobacco smoke had a greater adverse impact on the neurodevelopment of infants when combined with postpartum maternal hardships, such as shortages of food, clothing, or shelter (Perera 2005). Several studies found that increasing cumulative lifetime community exposures to lead are associated with accelerated cognitive decline in aging (Weisskopf 2007, Bandeen-Roche 2009, Weuve 2009). That connection appears to be strengthened in neighborhoods that generate psychosocial stressors such as hypervigilance, alarm, or perceived threat (Glass et al 2009). In both humans and laboratory animals, the adverse impacts of lead on neurodevelopment are significantly increased in the setting of an impoverished, stressful environment (Weiss et al 2006). Weiss and Bellinger argue that the social ecology of developing children strongly influences their responses to exposures to developmental neurotoxicants and should not be treated as a collection of confounders to be controlled for in data analysis.

Models, Mediators, and Pathways

Many studies investigate these links and their underlying mechanisms. Study design is challenging. Income, education, occupation, and race/ethnicity are commonly used alone or in combination as measures of SES. Each contributes, but to varying degrees in differing circumstances (Adler et al 2010). A study that controls for one or two of these may miss independent effects of the others. And it is often difficult to separate the effects of SES from those of

related environmental conditions.

The term “allostasis” refers to processes by which organisms respond to events and change in order to maintain homeostasis. A model using the concept of “allostatic load” is an attempt to integrate various stressors associated with SES and link them to biologic changes, including alterations in set points for neural, cardiovascular, autonomic, immune, and metabolic systems (McEwen 1998, 2008). Over time, excessive allostatic load can lead to feelings of helplessness and hopelessness and to behavioral changes, including excessive drinking and smoking and changes in sleep patterns. These add to an already-substantive burden and accelerate its impacts. Persistent and progressive changes in dysregulated biologic pathways can ultimately lead to acute and chronic disease. Stressed regulatory systems beginning in utero or during childhood may influence disease risks much later in life through epigenetic and other mechanisms currently being investigated (Gillman et al 2007). Of course, chronic disease can also interfere with education and employment opportunities, increasing the risk of lower SES.

Levels of glucocorticoids and sympathetic activity increase with allostatic load. Parasympathetic activity declines (McEwen 1998, Adler et al 2010). Levels of proinflammatory markers are higher in people with lower SES. For example, in a study of children with asthma, lower family income and higher levels of home stress were associated with higher baseline (all children were asymptomatic when tested) levels of IL-5, IL-13, and eosinophils (Chen et al 2006). These findings suggest that lower SES situates children with asthma closer

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to the threshold of clinical symptoms than their better-off counterparts.

Studies in adults typically find individual SES, as measured by income and education, inversely related to levels of IL-6 and C-reactive protein (CRP) (Adler et al 2010). A study of 851 adult men and women also found community SES inversely associated with IL-6 and CRP (Petersen et al 2008). A cross-sectional and prospective study also found higher levels of markers of oxidative stress and lower levels of antioxidants associated with lower SES, as measured by education, occupation, and income (Janicki-Deverts et al 2009). This association persisted after correcting for smoking, alcohol consumption, and depressive symptoms, but it is unclear whether the effect size is clinically relevant.

It is worth noting how commonly elevated markers of inflammation and oxidative stress are present in many common chronic diseases or disorders that disproportionately impact people of lower SES (Stein et al 2010). These are likely to be among the mechanisms by which lower SES becomes entangled in causal disease pathways.

Multilevel Implications

The strong inverse relationship between SES and chronic disease risk has significant implications for individuals, communities, clinical medicine, public health, and public policy decision making. At a societal level, efforts to diminish the SES gradient are among the ways to reduce its impacts. Improved access to high-quality education, making certain that households have adequate income, and improving employment opportunities will help, but of course these require resources and political will. Minimizing the consequences of lower SES by lowering the allostatic load in families and individuals is another approach. Clinicians can encourage lifestyle changes in individuals in order to lower their risk profiles through multiple mechanisms. If available, lifestyle intervention programs are worth considering. One study of an insurance-sponsored program for people with coronary heart disease showed that people with lower SES participate and

benefit as much as those with higher SES (Govil et al 2009). The participants in this study generally had at least a high school education, and it is unclear whether these findings are more broadly generalizable. A previous study showed that a lifestyle intervention program was less beneficial for people who were less educated and had lower health literacy and lower self-esteem (Winkleby et al 1994).

Clinicians can also become advocates for improved access to healthy food, adequate housing, recreation facilities, reduced exposures to hazardous chemicals and environmental pollutants, and safer neighborhoods. These interventions will benefit everyone, particularly those people who are more susceptible to acute and chronic illness because of their SES. For example, in Dane County, Wisconsin, the black-white difference in infant mortality has nearly disappeared over the past ten years without any significant changes in obstetrical services available to low-income women (CDC 2009). This trend has not been observed in other Wisconsin communities where health insurance coverage, targeted public health programs, and WIC (Women, Infants, and Children) nutrition programs are also available. Many observers attribute the changes in Dane County to improved neighborhood safety and support and advocacy for low-income black women and families, along with improved economic status and social inclusion. One theory gaining increasing support holds that we must take a life-course perspective on factors that influence pregnancy outcomes rather than focusing on specific variables only during pregnancy (Lu et al 2003).

Finally, since lower SES causes increased vulnerability to additional environmental stressors, it is incumbent upon policy makers, regulators, and public health officials to account for this when evaluating risks. Recently, a committee of the National Research Council recommended that the framework for risk assessment of chemicals be modified to account for uncertainty and variability in the response to exposures (NRC 2009). In particular, the committee recommended accounting for variability in responses attributable to age, ethnic group, and socioeconomic status, as well as other

attributes that affect individuals and make them a part of a vulnerable group. It is essential that recommendations from this committee are incorporated in risk assessments performed by regulatory agencies and others charged with protecting public health, including people who are most vulnerable. **sfm**

Ted Schettler MD, MPH, is science director of the Science and Environmental Health Network, the Collaborative on Health and Environment, and is a science advisor to the Health Care Without Harm campaign.

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A full list of references is available online at www.sfms.org/environmentalhealth2010.

Pollution-Related Illness Led to \$193M in CA Hospital Spending

Asthma, pneumonia, and other pollution-related health problems contributed to \$193 million in California hospital spending between 2005 and 2007, according to a recent Rand study, the *Sacramento Bee* reported on March 2, 2010. For the study, researchers analyzed treatment at more than 400 California hospitals for conditions linked to air pollution. Researchers found that three-quarters of the health problems analyzed were the result of high levels of fine particulate pollution, in which small quantities of soot get trapped in the lungs. One-quarter of the analyzed conditions were triggered by breathing ozone. The study found that pollution-related conditions led to 29,808 emergency department visits and hospital admissions over the three-year period. It noted that more than 12,000 ED visits were related to asthma for children younger than age seventeen. Researchers noted that hospital admissions for acute bronchitis, pneumonia, and chronic obstructive pulmonary disease were the most costly pollution-related conditions, accounting for nearly one-third of the total health care spending. The study also found that Medicare and Medi-Cal are covering two-thirds of the health costs related to poor air quality. A link to the full study is available on our website, www.sfms.org/environmentalhealth2010.

Scientific Support for Endocrine Disruption

The Endocrine Society Makes the Case

Loretta Doan, PhD, and Linda C. Guidice, MD, PhD

Endocrine-disrupting chemicals (EDCs) are substances in our environment, food, and consumer products that interfere with hormone biosynthesis, metabolism, or action resulting in a deviation from normal homeostatic control or reproduction. Due to the increasing body of scientific evidence indicating possible health threats posed by EDCs, the Endocrine Society has undertaken a number of initiatives to increase awareness of the science of EDCs and to ensure that endocrine research is considered in policy-making decisions and in regulatory processes. The Society's activities in the area of EDCs include scientific programming at its annual meeting, ENDO; an in-depth scientific statement reviewing the state of the science of EDCs and making recommendations for improvement of scientific knowledge and regulatory processes; and a position statement that outlines the Society's views on the policy and regulation of EDCs. The Society continues to gain support for its efforts from the broader scientific and medical communities and is working actively in the realm of federal EDC legislation and regulation.

Endocrine-Disrupting Chemicals: An Endocrine Society Scientific Statement presents the evidence that endocrine disruptors have effects on multiple endocrine systems, including male and female reproduction, breast development and cancer, prostate cancer, neuroendocrinology, thyroid, metabolism and obesity, and cardiovascular endocrinology. The statement represents a comprehensive review of the scientific literature on EDCs—including animal studies, clinical observations, and epidemiological stud-

ies—and concludes that the evidence indicates that EDCs are a significant public health concern. EDCs function through a number of mechanisms, most of which involve pathways that are highly conserved across species. Mechanisms include actions through nuclear and neurotransmitter receptors, steroidogenic enzymes, and many other pathways that can be modeled in the laboratory using *in vitro* and *in vivo* models. A broad array of molecules have EDC functions, including organochlorinated pesticides and industrial chemicals, plastics and plasticizers, fuels, and many other chemicals that are in widespread use in manufacturing and industrial applications, are present in the environment, or can be found in humans. The Endocrine Society makes a number of recommendations to increase understanding of EDCs' effects and to ensure that policy decisions are informed by the entirety of the scientific evidence. Specific recommendations include enhancing increased basic and clinical research, using precaution in the face of uncertainty during policy and regulatory decision making, and advocating involvement of individual and scientific society stakeholders in communicating and implementing changes in public policy and awareness.

Medical Community Supports EDC Policy Goals

In order to further a number of the policy goals outlined in the scientific statement and position statement, the Endocrine Society is building support in the medical community and with policy makers. At the 2009 Interim Meeting, the American Medical Association (AMA)

House of Delegates (HOD) passed a resolution introduced by the Endocrine Society on the regulation of endocrine-disrupting chemicals. The resolution was cosponsored by the American Association of Clinical Endocrinologists and the American Society for Reproductive Medicine, with support from the American College of Obstetricians and Gynecologists; the Society for Occupational and Environmental Health; the California Medical Association; and from the Endocrine, Subspecialty, and Young Physician Section Councils of the HOD. Upon passing the resolution, the HOD established new AMA policy on EDC regulation, which states:

The AMA will work with the federal government to pursue the following tenets: Regulatory oversight of endocrine-disrupting chemicals should be centralized so that regulations pass through a single office to ensure coordination among agencies, with the exception of pharmaceutical agents that are regulated by the Food and Drug Administration and are used for medicinal purposes; policy should be based on comprehensive data covering both low-level and high-level exposures; and policy should be developed and revised under the direction of a collaborative group comprising endocrinologists, toxicologists, occupational/environmental medicine specialists, epidemiologists, and policy makers.

The adoption of these principles by the HOD represents a broad consensus among the entire medical community that more needs to be done to protect the public from potential health risks of exposure to EDCs. As AMA policy, these tenets enjoy the full support of the House of Medicine.


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EDC Regulation Gains Traction on Capitol Hill

Policy makers have shown interest in the effects of EDCs, introducing legislation to ban bisphenol A, to strengthen the EDC research program at the National Institute of Environmental Health Sciences (NIEHS), and to reform the Toxic Substance Control Act (TSCA). Through its scientific statement, the Society has come to be recognized by lawmakers as a primary source of scientific expertise on EDCs. In support of its policy goals, the Society endorsed the Endocrine Disruption Prevention Act of 2009 (HR 4190/S 2828), introduced by Representative Jim Moran (D-VA) and Senator John Kerry (D-MA) on December 3, 2009. Entirely in line with the Society's positions, the bill will advance EDC science and improve the regulatory process by ensuring it is informed by the best science. Specifically, the bill addresses the need for more research on EDCs and coordinated output of research results, proposing to develop a research program under the auspices of NIEHS.

To advance the Society's goal of strengthening regulation of EDCs, the Society has discussed the findings of the scientific statement with staff of the committees that have jurisdiction over this issue, including the House Energy and Commerce Committee and the Senate Environment and Public Works Committee, and with the staff of Representatives Moran, Slaughter (D-NY), Rush (D-IL), and Markey (D-MA). The Society also provided comments on draft language to overhaul the Toxic Substances Control Act and continues to offer its support to this ongoing process.

The Endocrine Society will continue to work to further its policy goals and to strengthen the case for science in the regulation of EDCs. The Society is encouraged by the invaluable support of the medical community in these efforts. 

Loretta Doan, PhD, is associate director, Science Policy, the Endocrine Society. Linda C. Giudice, MD, PhD, is professor and chair of the Department of Obstetrics, Gy-

necology, and Reproductive Sciences at the University of California, San Francisco. As a reproductive endocrinologist and translational scientist, she has a major interest in environmental reproductive health and particularly in endocrine-disrupting chemicals. She was a co-organizer of the Vallambrosa Workshop on fertility and reproductive health and founder of the UCSF Program on Reproductive Health and the Environment. To learn more, visit www.endo-society.org.


A Climate Change for the Better

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change are also showing new life. The NIH has dedicated more than \$3.5 million in American Reinvestment and Recovery Act funds to support five studies of health impacts of climate change, including modeling health impacts of wildfires and assessing vulnerability to heat stress. Over the past two years, EPA's STAR grant program has invested \$17 million in studies of how climate change effects on air quality and water quality can in turn affect health, as well as in modeling health cobenefits of greenhouse gas reduction actions. And a soon-to-be released white paper authored by a team of federal scientists (led by the National Institute of Environmental Health Sciences) summarizes the state of the science on health effects and identifies research needs to help guide future investments. One outcome of this exercise is that the input and engagement of physicians and other public health professionals in all forms and phases of this research will be critical to its success.

In addition to research, the federal government is taking a more active role in building public health capacity for responding to climate change. The CDC recently announced a \$1.8 million program to support state and local health departments in a variety of public health activities pertaining to climate change health impacts, including surveillance and monitoring, response planning, and program evaluation. The White House Office of Science and Technology Policy (OSTP) recently chartered a new inter-agency group on climate change and

human health to be cochaired by the OSTP, NIEHS, and EPA. The group will coordinate federal research efforts on human health aspects of climate change and work with the White House Climate Change Adaptation Task Force to catalyze creation of an integrated response to climate change and health throughout the different levels of government, from federal to tribal, state, and local. The crosscutting dimension of the group will extend beyond government agencies to engagement with various stakeholders and partners, including the overlapping medical and public health communities who will form an integral part of the U.S. response to climate change.

Such engagement is supported by the AMA resolution, as well as by *The Lancet* authors who issued a call to health professionals to "reach beyond conventional professional boundaries to collaborate with policy makers and scientists concerned with the study, development, and implementation of policies and technologies to mitigate climate change."¹ The NIEHS is thrilled to see the public health and medical communities warming to the idea that we all have a role to play in preventing additional illness and suffering as a result of climate change. That's a change in climate we should all welcome. 

Linda S. Birnbaum, PhD, DABT, ATS, is director of the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health and the National Toxicology Program. The author of more than six hundred peer-reviewed publications, book chapters, abstracts, and reports, she has been president of the International Union of Toxicology and of the Society of Toxicology, the largest professional organization of toxicologists in the world. John M. Balbus, MD, MPH, serves as senior public health advisor to the NIEHS director and leads NIEHS efforts on climate change and human health. He was formerly chief health scientist for Environmental Defense Fund.

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A full list of references is available online at www.sfms.org/environmentalhealth2010.

Can Plastic Hurt You?

The Case of BPA

William H. Goodson III, MD, and Shanaz Dairkee, PhD

Two issues arise when considering a possible role of synthetic estrogen-like chemicals or xenoestrogens, such as bisphenol A, in the risk of breast cancer. First, is there an increase in breast cancer that is not explained by other factors? Second, does bisphenol A (often called BPA) have carcinogenic effects?

There has been a steady rise in female breast cancer, at a rate of 1.39 percent per year, since collection of SEER (Surveillance Epidemiology and End Results) data began in 1973. After publication of the Women's Health Initiative study, which showed increased breast cancer in women taking combined estrogen and progestin hormone replacement therapy (HRT), a slight drop in breast cancer rates was reported. Intuitively associated with the discontinuation of HRT use, the drop actually started about two years before the report was published. More importantly, over the last thirty years there has been a steady increase in hormone responsive (ER-positive) breast cancers in women between the ages of thirty and fifty years, a group not usually on HRT.

Some have argued that this might be an effect of oral contraceptive use. Although there is data suggesting that early high dose oral contraceptives might increase premenopausal breast cancer, more recent studies have showed no effect with newer low-dose oral contraceptives.

Most recently, British epidemiologists have concluded that the increasing incidence of ER-positive breast cancer is due to delayed childbirth and the decreased time of nursing that is common in developed Western countries.

On the basis of these studies, the

possible role of xenoestrogens in breast cancer has been brought to light, marking a likely end to this debate. A recent National Cancer Institute study looking at breast cancer in men in the same SEER data reports that male breast cancer has increased at the rate of 0.86 percent per year during the same three decades that female breast cancer has risen. Clearly, the increasing incidence of male breast cancer cannot be attributed to prescribed hormones, reproductive patterns, or infant nursing practices. As the authors of this study have concluded, there are likely common "environmental exposures" shared by men and women that increase the risk of breast cancer in both groups.

As an aside, some studies of xenoestrogens in malignant and nonmalignant breast tissue have failed to observe any effects. These studies are reminiscent of the public discourse 100 years ago about the safety of lead service pipes for home plumbing. The skeptics argued that four people could drink water from the same pipe, but since only one got sick there must be another cause that affected just that one person. At the time, the concept of individual genetic variability was not well understood. It turns out that, for reasons not yet discerned, only about half of persons who drink water with high lead content will actually develop high lead blood levels. Of those with high lead blood levels, only about half will actually get severe lead poisoning.

This is the state of affairs with xenoestrogens. Note the unsigned editorial in the *Wall Street Journal* (January 31, 2010), which stated that BPA is safe because it is already all around us. This is tantamount to arguing thirty years ago

that tobacco smoke was safe because it was all around us.

Bisphenol A was first synthesized more than 100 years ago. During the explosion of information about hormones in the 1930s, Dodds and Lawson in England reported that the phenanthrene ring system structure that is typical of steroid hormones is not actually necessary for estrogenic effects. One of the chemicals tested a few years earlier by Easson and colleagues was 4:4'-dihydroxy diphenyl methane—bisphenol A for short. The story goes that diethylstilbestrol was tested at the same time, and it was developed for clinical use because it was even more potent.

During World War II, BPA found a major role in the war effort in aircraft windshields and other materials. Currently we encounter BPA in many products ranging from eyeglasses to safety masks to Blackberries. We also ingest BPA in our foodstuffs. BPA leaches from the epoxy lining of food and beverage cans into our daily diet. It is sobering to know that in 2003, the National Health and Nutrition Examination Survey and the Centers for Disease Control found BPA in urine from 90 percent of a random sample of representative Americans. This is especially poignant since BPA ingested by volunteers clears from blood within 24 hours.

There are few studies of BPA in serum, but two available reports confirmed exposure of vulnerable populations—unborn children. Both studies measured BPA concentration in maternal and cord blood. One also measured BPA in placenta tissue. In these studies, one in the United

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States and one in Germany, maternal BPA levels ranged from 0.2 to 22 pg/ml and fetal or cord blood ranged from 0.2 to 11 pg/ml.

It has been known for a long time that exposure of mice to ingested BPA has developmental consequences. At California Pacific Medical Center Research Institute, we asked if similar levels of BPA alter human cells. Instead of using immortalized cell lines, we designed our studies with cells freshly removed from human tissue and sustained in tissue culture for just a few generations (one to two months at the most).


Since we wanted to test the effects of BPA on a more vulnerable, high-risk population, in accordance with IRB approved guidelines and patient consents, we collected cells by fine needle aspiration from the opposite breast of women undergoing breast surgery. The total sample size was the equivalent of three drops of breast fat and cells combined. These women were known to be at increased risk because of personal or family history of breast cancer, a biopsy that showed a premalignant change, or increased breast density on mammograms.

We were uniquely successful in growing these cells, enabling comparisons between no treatment and BPA exposure at a concentration as low as that reported in pregnant moms at parturition. Working with colleagues at the Stanford Genome Technology Center, we used gene array technology to scan the RNA isolated from the above-mentioned exposures for the expression of 44,000 gene sequences. Our results were sobering.

In cells exposed to BPA at a concentration found in human mothers, sets of genes that control cell differentiation were suppressed or turned off, and those that regulate metabolism, protein synthesis, cell cycle—metabolic activity—were turned on or overexpressed. When we looked at breast cancers, in those cases that harbored this same pattern of decreased differentiation and increased metabolism, the patients had a marked decrease in survival from cancer.

Do we have the proverbial “smoking

gun” yet? Not quite, but we have much supportive evidence. There has been an increase in hormone-driven breast cancer. But males show the same increase, so the usual suspect of prescribed hormones cannot explain this outcome. We know for a fact that we are all exposed to BPA all the time. We also know that at-risk populations are similarly exposed to BPA. We can demonstrate that nonmalignant human breast epithelial cells change when exposed to BPA at the concentrations already known to persist in people. We know that such BPA-induced changes are commonly harbored by aggressive breast tumors.

There is cause for concern and need for a lot more work immediately. 

William H. Goodson III, MD, is a senior clinical research scientist at the California Pacific Medical Center Research Institute. He is also in active practice as a breast surgeon at CPMC and is a past president of the SFMS. Shanaz H. Dairkee, PhD, is a senior scientist at the California Pacific Medical Center Research Institute.

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The Weight of Evidence

Will Reducing Chemical Exposures Combat the Obesity Epidemic?

J.P. Myers, PhD

Obesity has reached epidemic proportions in many countries around the world. This is especially evident in the United States, where, by 2002, 30 percent of adults met the criteria of “clinically obese” (Hedley et al 2004). After two decades of sharp growth in the final fifth of the twentieth century, one in six U.S. adolescents is now obese (Ogden et al 2010).

How serious is this trend? Enough to engage the White House, with First Lady Michelle Obama launching a campaign in February 2010, to curb childhood obesity. Unfortunately, it appears that the focus of that campaign may be missing some very big opportunities.

Interventions to combat the obesity epidemic, including the new White House effort, have targeted what are widely believed to be the two principal contributors to obesity: insufficient caloric expenditure and excess caloric intake (“the big two,” Keith et al 2006). Yet despite widespread and expensive efforts focused on “the big two” by public health agencies, private foundations, educators, and medical practitioners, the high prevalence in youth has remained steady for the past ten years (Ogden et al 2010).

A recent review of “the big two” concluded that undue attention was being devoted to reduced physical activity and excessive caloric intake “leading to neglect of other plausible mechanisms and well-intentioned but potentially ill-founded proposals for reducing obesity rates” (Keith et al 2006).

Since publication of that review, substantial evidence has emerged that increases the plausibility of one of the alternative mechanisms suggested by Keith

et al: disruption of weight regulation by endocrine-disrupting chemicals (EDCs) in the environment. Plausible mechanisms have emerged from animal and cell research, and some epidemiological studies have suggested associations between certain contaminants and obesity (Newbold et al 2007; Heindel and vom Saal 2009).

This is potentially very good news for the fight against obesity. If EDCs are contributing to the epidemic, then measures taken to reduce exposures may offer a practical means to alleviate some portion of this disease burden. Several of the implicated contaminants are not persistent and are eliminated relatively quickly from human fluids and tissue. Previous experience demonstrates clearly that policy interventions can lead to dramatic declines in U.S. contamination levels, even with highly persistent compounds (e.g., lead, DDT, hexachlorobenzene).

Developmental Origins of Adult Disease

Concerns about the potential contribution of EDCs to childhood obesity build from two considerations, one out of human biology and the other from animal experiments:

First, it is now well established that events early in human life, particularly in the womb, can have long-term consequences for health, including increased risks of heart disease, obesity, and type II diabetes. Studies of people clearly show that fetal nutrition plays a vital role in setting risk to these chronic diseases (Gluckman et al 2007).

Second, while research on “developmental origins” initially focused largely on nutrition, animal research proves that

early life is also a window of sensitivity to chemical exposures, which can powerfully affect the course of development and cause chronic diseases later in the life of the animal.

Prior to 2005, the experimental literature is peppered with scattered examples in which animals in the experimental group show weight gain compared to controls (Baille-Hamilton 2002), but these experiments were never designed to test for weight gain per se. Indeed, viewed through the lens of traditional toxicology, weight gain is good; it implies health. The toxicologists were concerned more with weight loss, which was seen as an adverse outcome.

In 2005, Newbold et al published results of an experiment expressly designed to test the hypothesis that early life exposure to an EDC could cause adult obesity (Newbold et al 2005). Newbold had noticed that experimental animals (mice) used in her research on the synthetic estrogen diethylstilbestrol (DES) often developed into morbidly obese adults following exposure to DES right after birth. In the experiment, Newbold et al treated the animals with approximately one part per billion of the animal’s body weight per day (1µg/kg/day) for the first five days of neonatal life. While the females did not differ from controls during treatment, by adulthood the DES-treated female mice were obese.

A series of studies now unequivocally demonstrate that obesity in adult animals can be caused by exposures to specific chemicals in the womb (reviewed in Newbold et al 2009, Heindel and vom Saal 2009). They also shed light on the po-

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Is Ignorance Bliss?

Measuring My Own Toxins

Larry B. Silver, MD

As a child and adolescent psychiatrist, my primary areas of clinical work and research have related to the neurologically based disorders that impact cognitive, language, and motor functioning: learning disabilities, language disabilities, sensory processing disorder, attention deficit hyperactivity disorder, and the intellectual disabilities.

Brain development occurs early in pregnancy through a complex process involving genetic messaging and neuroendocrines. This complex interaction between the genetic code and the specific neuroendocrines are critical to the development of the brain, including cell proliferation, cell migration, formation of connections between nerve cells, programmed cell death, and myelination.

At birth, the brain has every nerve cell it will ever have. Through a planned process of maturation combined with the impact of stimulation versus lack of stimulation of specific nerve cells, the infant brain evolves into the child brain and then the adolescent and adult brain.

Excellent research literature has provided increasing knowledge on the impact of environmental toxins in the air, water, and food on brain development in utero and during childhood and adolescence. I have found this increasing body of knowledge fascinating and a possible explanation for the increased incidence of each of the disabilities I had a special interest in.

In 2000, as president of the Learning Disabilities Association of America, I was invited to a conference on environmental toxins. I joined representatives from organizations representing each of the developmental disabilities I worked with, plus those from organizations represent-

ing many other areas of developmental disabilities as well as major organizations concerned with significant health issues. Between the speakers and the informal interactions of the participants, I quickly became aware that there was extensive information on the negative impact of environmental toxins. And these impacts were not just on the developmental disabilities I studied but on the increases in many forms of cancer as well as other significant diseases.

I read Rachel Carson's books years ago. Now I began to read current and more relevant books (see "Suggested Reading" on page 21). I became active with the Learning and Developmental Disabilities Initiative and the Safer Chemicals, Healthy Families coalition.

As part of these activities, I was asked to participate in a biomonitoring project called the Body Burden Study. I became one of twelve individuals who agreed to have blood and urine samples taken to look for the presence of a set of synthetic chemicals and heavy metals. The results changed my thinking, magnified my concerns about environmental toxins, and expanded my interest in environmental toxins from a comfortable consumer of information to an active advocate for change.

Prior to receiving the results from this study, I used to think that problems with toxic chemicals only related to the poor who lived near industry, toxic waste dumps, or in housing with lead-based paint. These problems related to others, not to me. But the Body Burden Study, as well as the results of many other such studies done in the U.S., Canada, and other countries, opened my eyes. The impact of environmental toxic chemicals in our wa-

ter, food, and air impacts everyone, in every place throughout the world. *It impacted me and, thus, my family.*

Ignorance was bliss. Now, the information on environmental toxins took on a personal meaning. What could I do for myself, my wife, my children, my grandchildren?

The Study and Its Findings

The overall findings for the twelve participants showed the presence of sixty-one chemicals out of the eighty-nine tested for. All twelve participants tested positive for at least twenty-six of the tested chemicals. Each had detectable levels of bisphenol A (BPA), mercury, lead, polybrominated diphenyl ethers (PBDEs), perfluorinated compounds (PFCs), polychlorinated diphenyl ethers (PCDEs), and organic pesticides in their bodies. Eleven of the twelve participants had detectable levels of triclosan.

I went back and read the literature. But now I was not looking up an alphabet soup of terms. I was looking for what was inside of me. What did the findings mean *to me?*

I was high in polychlorinated diphenyl ethers (PCBs). These are fire retardants found in many items of clothing, furniture, bedding, and more.

I was high in triclosan. This as an antibacterial found in soaps, toothpastes, and many other personal care products.

I was high in the organochlorine pesticides. DDT was gone but I had lived during its time period. It is in clordane, lindane, hexachlorobenzene. It is in weed killers. Thus, even if I try to forget all of the materials I put on my lawn, what about the foods I eat or the liquids I drink?

I was high in perfluorinated compounds (PFCs). These chemicals are everywhere. If they are on the surface of something, they minimize anything sticking to the surface (Teflon). They act as water repellents (Scotchgard).

My mercury level was higher than recommended by the Centers for Disease Control and Prevention. I knew to limit the amount of tuna I ate. Where else might I have been exposed? What is it doing in my body?

My lead level was high as well. Maybe as a child I lived in a house with lead-based paint. But such intakes would have cleared by now. Where did this come from? What does it mean?

What Should/Could I Do?

I read the literature on each of these chemicals. Then I met with my personal physician and showed him my test results. He could not correlate the findings with any medical problems I have had or have now. But we both agreed that we were less knowledgeable than we should be.

There must be a way to avoid exposure to these toxins. How? I began to read on this theme. I quickly concluded that there was little I could do without major life changes, cost, and effort. Maybe I could use a cast-iron pan for cooking rather than one that is Teflon-coated. Maybe I could carefully study every item in my bathroom and look for products without these toxins. Maybe I could only buy organic foods, being careful to see how “organic” they were. Maybe. . . .

For now, I have given up on any but the easiest efforts. Even if I were convinced to do more, I doubt that I could get my family to go along. My body burden would remain where it is.

Maybe it is rationalization. Maybe it is avoidance. Or, maybe it is reality. I shifted my focus to taking more seriously the need to work with the organizations I belong to. I now have a personal awareness of the need to change the Toxic Substances Control Act and to get the U.S. Environmental Protection Agency to be more proactive.

Maybe I should not have volunteered to do the Body Burden Study. Then, all of my knowledge would continue to be intel-

lectual rather than personal.

Oh, well. It is too late now. **sfm**

Larry B. Silver, MD, is clinical professor of psychiatry at Georgetown University Medical Center.

Suggested Reading

Generations at Risk: Reproductive Health and the Environment, by Ted Schettler, Gina Solomon, Maria Valenti, and Annette Huddle. MIT Press, Boston, 2000.

In Harm's Way: Toxic Threats to Child Development—A Report by the Greater Boston Physicians for Social Responsibility, by Ted Shettler, Jill Stein, Fay Reich, Maria Valenti, and David Wallinga. Published by the Greater Boston Physicians for Social Responsibility, 11 Garden Street, Cambridge, MA 02138, 2000.

Our Stolen Future, by Theo Colborn, Diane Dumanoski, and John Peterson Myers. Penguin Books, New York, New York, 1996.

Slow Death by Rubber Duck, by Rick Smith and Bruce Lourie. Counterpoint Press, Berkeley, CA, 2009.

The Weight of Evidence

Continued from page 19. . .

tential molecular mechanisms underlying the effect: Many of these chemicals alter the behavior of specific genes that are involved in determining the number of fat cells (adipocytes) an individual will have as an adult. Animals exposed to contaminants that increase the activity of these genes wind up with more fat cells and thus are at greater risk for obesity. Contaminants that have this effect have been termed “obesogens” (Grün et al 2006). Studies also suggest other mechanisms, including interference with neurochemical signals that provide information to the brain about hunger.

The list of contaminants implicated by animal studies is substantial, including several estrogenic EDCs such as DES, bisphenol A, soy phytoestrogens (particularly important given widespread use of soy-based infant formula), certain phthalates, and a family of compounds called organotins.

It is particularly troubling that human exposure to these is widespread, if not

ubiquitous, and the exposure is at levels capable of causing obesogenic effects in animals. For example, the U.S. Centers for Disease Control reports that bisphenol A can be measured in more than 90 percent of Americans, with higher levels in youth.

Almost no human data are available to test the obesogen hypothesis in people. No epidemiological evidence exists, because the hypothesis is so new. A few studies associate chemical levels measured in adults with obesity (e.g., Stahlhut et al 2007), but these are not relevant to a developmental model. One in vitro experiment, however, has demonstrated that exposure to obesogens increases the rate of conversion of human stem cells to adipocytes (Kirchner et al 2010), confirming the validity of the basic mechanism and the relevance of the animal studies to people.

Conclusion

Chronic diseases are rarely the result of a single risk factor (Kirchner et al 2010). Such is almost certainly the case for obesity. Given the failures of current intervention attempts that focus on “the big two” and the serious health and economic burden that obesity is imposing on people around the world, the obesity epidemic challenges public health and medical professionals to look widely at potential causes, including those that at first might seem to be outside the box. These emerging studies, summarized briefly above, indicate that a substantial—but as yet undetermined—portion of the obesity epidemic may be caused by endocrine-disrupting chemicals. At the very least, this argues for urgent investment in additional research designed to test the obesogen hypothesis. It may also point toward interventions that are far more practical and effective than those indicated by a focus on “the big two.” That would be a big win for medicine and public health. **sfm**

J.P. Myers, PhD, is chief scientist of Environmental Health Sciences in Charlottesville, Virginia.

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A full list of references is available online at www.sfms.org/environmentalhealth2010.

Mercury Update 2010

Money, Politics, and Poison

Jane Hightower, MD

Ten years ago, I began investigating why I had so many health-conscious patients who had similar symptoms of fatigue, hair loss, headache, joint and muscle pain, gastrointestinal upset, and the like. My investigation kept turning up one thing in common: They were lovers of fish, especially large predatory fish, and they had blood and hair mercury levels that surpassed what the Environmental Protection Agency said was protective.

I was determined to find answers for my patients. I also wondered why so many physicians were ignorant of mercury's effects, of how to interpret the laboratory tests, and of what constituted mercury toxicity. My efforts led to the publication of my book, *Diagnosis: Mercury—Money, Politics and Poison*.

What started out as a concerned physician inquiry ended up as an investigation of a centuries-long medical debacle. Medical issues that pit industry versus government versus victim confuse what we do as physicians even today. In mercury's case, everywhere it has been, there have been people adversely affected—and also a tremendous amount of money to be made or lost. Syphilis pills, diuretics, skin creams, and mirrors. Hats, mercurochrome, dental fillings, and vaccines. All have been cause for concern because of mercury content and the resultant complaints of harm.

Even today, as the American public is being urged to eat more fish instead of meat, the FDA has been poor at issuing guidelines about which types of fish are relatively low in mercury (sardines, anchovies, herring, sole, wild salmon) and which have high levels (swordfish, shark, sea bass, tile fish, sail fish, large snapper, some large species of tuna). The FDA, even as recently


as December 2008, issued a draft report saying that the benefits of omega-3 fatty acids far outweigh the risk of mercury and that pregnant women should eat more fish than the currently recommended twelve ounces per week. That risk assessment did not rely heavily on current literature, nor did it fully address the extent of mercury effects on human health.

In fact, the report stated that the FDA's risk assessment relied "heavily" on data from a massive poisoning that happened in Iraq in 1971–1972. This poisoning that occurred when the Ba'ath party (Saddam Hussein being vice president) was struggling for control of oil-rich lands and majority rule. You would think that by now, with all that we know about Iraqi history, the FDA officials would investigate for themselves whether such information provided accurate enough data to use in constructing a reliable (and still current) policy.

Diagnosis: Mercury is the first and only book to investigate how industry-funded researchers, Saddam's scientists, and the FDA decided for the people and for health care professionals how we should look at mercury exposure in our patients. To date, the FDA only gives warning for reproductive women, infants, and children. The rest of us are on our own to look at the literature. And because the current FDA standard was decided upon in a court of law using industry-funded researchers, we probably will not see a broadening of the mercury advisory any time soon. In the court case that decided our fate, the threshold for a minimal clinical effect level was determined to be 400 mcg/l in the blood, even though the type of epidemiological science conducted in Iraq was not capable

of making that determination. The EPA currently wants us to keep the mercury level in our blood below 5.0 mcg/l. The current literature supports the EPA's advice, and even questions whether this is protective enough. A "safe" level for mercury has yet to be found.

Current concerns about the health effects of mercury include nonspecific symptoms, cardiovascular disease, atherosclerosis, autoimmune disease, neuropsychiatric damage, and infertility. In-utero exposure studies continue to identify lasting adverse effects in children.

The FDA is making itself obsolete. It was originally established to protect the public from charlatans and dangerous whiskey distillers. It now struggles in all areas to keep our food and drugs safe. As physicians learn more about how toxicants in our food and environment affect our patients, more people will come forward, looking for answers. As a *British Medical Journal* editorial in 1972 stated in response to the Iraqi poisoning, "there is a danger that hypothetical hazards will attract study while little is done to prevent real hazards, for it is easier to form pious resolutions than to stop people doing dangerous things. But the manufacturers and distributors of substances known to be dangerous can be identified and their activities controlled—though probably only by the concerted action of medical men [and women]." 

Jane Hightower, MD, specializes in internal medicine at California Pacific Medical Center in San Francisco and has done extensive research on mercury exposure from fish in adults. She is a member of the San Francisco Medical Society and has served on the SFMS Board of Directors.

Chemical Policy Reform

A Clinical Perspective

Gina M. Solomon, MD, MPH

When I was a resident training in Internal Medicine and Occupational and Environmental Medicine, I saw a patient who changed the course of my life. She was a young woman, pregnant with her first child, who had asked her obstetrician whether chemicals in her workplace could harm her fetus. Her obstetrician referred her to the clinic where I then worked.

The patient had recently completed her master's degree and had a good job in the quality control laboratory of a specialty chemicals manufacturing facility. She took tiny samples from each batch of chemicals made at the facility and dissolved them in a solvent before running them through a mass spectrometer to test them for purity. When she came to her appointment at the clinic, she brought with her a large stack of Material Safety Data Sheets (MSDS) with some information about each of the chemicals she handled.

But when I started to go through the stack, I noticed some real problems. Many of the chemical names weren't listed. Instead, there were annotations of "confidential business information." Most of the health information was blank or unknown. I eventually threw the stack of papers on the desk in disgust. What was I supposed to tell my patient?

It was my first introduction to the flawed chemical safety system in the United States. I was shocked then to learn that: an estimated 60,000 chemicals that were already in use before 1976 were "grandfathered in" under the Toxic Substances Control Act (TSCA) and therefore were never tested for toxicity; the estimated 2,000 new chemicals that come on the market annually also do not need to be

tested for safety—manufacturers must submit whatever toxicity information they have, but if they don't test, they don't have to tell; Broad Confidential Business Information (CBI) provisions allow chemical manufacturers and product formulators to keep most information about chemicals (even their names) secret; the government often does not have the authority to take action to protect the public from hazardous chemicals, since any chemical regulations need to be demonstrated to be the "least burdensome" for industry.

The pervasive flaws of the 1976 TSCA law on toxic chemicals have conspired to create a situation in which extremely hazardous chemicals can be widely used in workplaces and even in consumer products, with minimal or no oversight.

There's a real human cost to this flawed chemical safety system. In fact, although all of her treating physicians advised that the woman and her employer play it safe and avoid exposures during pregnancy, the employer concluded there was no clear evidence that the chemicals were harmful. No alternative job assignments were available at the company. My patient had to decide between losing her job and risking her baby. Her "Sophie's choice" turned out badly.

During her third trimester, there was a chemical spill in the lab that soaked her clothes and dissolved her gloves, she became ill, and shortly afterward she had a stillbirth.¹ Since then, the science has become clearer, and the solvent she handled every day is now considered a known reproductive toxicant.²

I saw that patient in 1994, but unfortunately nothing has changed since then. The flawed Toxic Substances Control Act

is still the law of the land, chemicals are still not being tested for safety, the public still has limited access to information, and the Environmental Protection Agency is still paralyzed and unable to take action to control dangerous chemicals.

Not only is there a terrible personal and emotional toll when someone is sickened by toxic chemicals, but there is also a serious strain on our health care system. Most practicing physicians are acutely aware of the tremendous cost and burden of health care in the United States. But there's one element of this burden that many physicians don't see. In the occupational and environmental medicine clinic where I work at UCSF, we specialize in seeing patients who have become ill due to exposures to chemicals in their workplace or environment.³ Sometimes the concerns are related to contaminants discovered in well water; sometimes it is a respiratory problem related to indoor air quality; sometimes chemicals in consumer products are implicated in a child's illness. One common theme is that these illnesses are preventable.

A recent report summarized peer-reviewed scientific literature on environmentally related disease and health.⁴ It concluded that about 5 percent of childhood cancer; 10 percent of diabetes, Parkinson's disease, and neurodevelopmental deficiencies; and 30 percent of childhood asthma are likely to be attributable to environmental exposures. Unquantifiable but significant fractions of reproductive problems and miscarriages are due to chemicals as well. The report concludes that even if chemical policy reform only reduces the prevalence of these diseases by one-tenth of one per-

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cent, the United States would save about \$5 billion dollars per year in health care costs.

But my motivation isn't just the health care cost savings. I'm fighting for my patient. She shouldn't have had to suffer because of a flawed chemical safety system. There is a national effort underway to reform the Toxic Substances Control Act.⁵ If doctors have the data they need on chemical toxicity, they can advise their patients. Then we can prevent what we cannot cure. **sfm**

Gina Solomon, MD, MPH is codirector of the UCSF Occupational and Environmental Medicine Residency and Fellowship Program. She is an associate clinical professor of medicine at UCSF and the associate director of the UCSF Pediatric Environmental Health Specialty Unit. Trained at Harvard and Yale, she is a senior scientist at the Natural Resources Defense Council.

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Environmental Health Materials for Clinicians

From: <http://healthandenvironmentonline.com/2010/02/18/environmental-health-materials-for-clinicians/>

Health & Environment describes some work being done in the U.S. to make environmental health science relevant to clinical practice. Key concepts include trust and transparency, so that environmental health science is presented in such a way as to inspire clinicians' confidence in its accuracy and relevance.

However, the clinicians and public health practitioners trying to do this have a difficult impasse to break: Because of differences in the evidence streams between clinical medicine and environmental health, little environmental health makes its way into medical education.

That lack of education itself feeds the perception that environmental health issues are not immediately relevant to health care, making it still more difficult to introduce that information into medical education and clinical guidance.

One source of inspiration has been the American Academy of Pediatrics (AAP), which is considered in many ways to be ahead of the game. More than fifty years ago, the AAP established its committee on environmental health and in 1999 published its first practical text, *Pediatric Environmental Health*, now in its third edition.

The work by the AAP is being used as a platform for developing other environmental health tools in the U.S. Some of the best of these, and other resources for information, are listed below.

Educational Materials and Tool Kits

- **PSR tool kit:** U.S. Physicians for Social Responsibility developed this tool kit for clinicians, which has been endorsed by the AAP. <http://www.psr.org/resources/pediatric-toolkit.html>
- **USCDC Continuing Medical Education:** An accredited online learning module about environmental health issues, from the U.S. Centers for Disease Control and Prevention. http://www.atsdr.cdc.gov/emes/health_professionals/pediatrics.html
- **ARHP Clinical Proceedings:** A clinical guidance document by the U.S. Association of Reproductive Health Professionals, designed to explain some of the issues and to provide assurance on the merits of the science around environmental influences on reproductive health. <http://arhp.org/publications-and-resources/clinical-proceedings/rhe>

The Navigation Guide

An Evidence-Based Tool to Bridge the Gap between Clinical Practice and Environmental Health Science

Patrice Sutton, MPH; Jeanne Conry, MD, PhD; Pablo Rodriguez, MD; and Tracey Woodruff, PhD, MPH

Rapidly accumulating evidence indicates that ubiquitous exposure to “everyday” levels of environmental chemicals can manifest in a wide range of adverse health outcomes across the human lifespan and generations.^{1,2} Approximately 87,000 chemical substances were registered for use in U.S. commerce as of 2006, with about 3,000 chemicals manufactured or imported in excess of 1 million pounds each,³ and 700 new industrial chemicals are introduced into commerce each year. Today, these chemicals are distributed throughout patients’ homes, workplaces, and communities, contaminating food, water, air, and consumer products. Everyone in the U.S. has measurable levels of multiple environmental contaminants.⁴ While many scientific questions remain, the strength of the evidence is sufficiently high that leading health care professionals and scientists have called for timely action to prevent harm.⁵⁻⁷

How have these calls to action reverberated in the trenches of clinical practice? The scientific evidence linking environmental contaminants and adverse human health impacts is voluminous and largely unfamiliar to practicing clinicians. There is no trusted, ready reference or compendium to consult in order to provide patients with timely, evidence-based advice about their exposure to environmental contaminants (unlike the situation with pharmaceuticals). Hence providing evidence-based anticipatory guidance about environmental exposures is far outside the comfort zone and time constraints of most clinicians. Yet patients armed with Internet printouts are clamoring for advice about topics as wide-ranging as the potential for harm from the chemicals in their babies’ bottles to whether their workplace exposure to toxic chemi-

cals will have an adverse impact on their pregnancies. Many more patients may be unaware of the preventable harms they and their families face from toxic substances in their homes, workplaces, and community environments. Health care providers have a professional and ethical responsibility to provide prevention-oriented guidance in all of these situations. By proactively intervening to protect patients from harmful environmental exposures linked to a myriad of chronic diseases and disabilities, health professionals can improve patient health outcomes more broadly.

In an effort to speed the translation of environmental health science into improved patient outcomes, the University of California San Francisco’s Program on Reproductive Health and the Environment undertook an interdisciplinary collaborative effort to develop the *Navigation Guide*, a systematic and transparent road map for evaluating the relevant scientific evidence. The *Navigation Guide* is based on contemporary methods of evidence-based medicine (EBM). The purpose of the *Navigation Guide* is to build a foundation that can be used to provide the practicing clinician with an easy, transparent, and quick way to incorporate the state of the science, patient values and preferences, and other factors into clinical care decisions.

Perhaps the most unfamiliar aspect of environmental health for the practicing physician is the need to advise patients about their exposures in the absence of human experimental data (i.e., randomized-controlled trials [RCTs]) linking the exposure to a health outcome. When it comes to advising patients regarding their exposure to environmental contaminants, a clinician should not wait for human experimental

evidence—it will almost never be available. In the context of preventing adverse exposure to environmental contaminants, clinicians need to take timely action based primarily on scientific evidence from animal (in vivo) and in vitro studies. This can seem counterintuitive, because the use of in vivo and in vitro studies are not routinely part of daily clinical practice and are often misunderstood by clinicians as “weak” evidence.

However, in vivo and in vitro data are integral to regulatory scrutiny of compounds used every day in clinical practice. Pharmaceuticals are tested for toxicity and to ensure benefits outweigh harms before a physician can decide whether or not to prescribe the drug (Figure, page 26). Before a drug can even be tested in humans, the company or sponsor is required to perform in vitro and in vivo laboratory tests to discover how the drug works and whether it’s likely to be safe and work well in humans. Only after the substance has undergone toxicity testing can humans be exposed in RCTs. Finally, before a drug is approved for sale, an independent and unbiased review must establish that a drug’s health benefits outweigh its known risks. Therefore, in vivo, in vitro, and human experimental evidence—plus an analysis of risks and benefits—have all informed human exposure decisions *prior* to the substance’s entry into the marketplace. Once a drug is on the market, postmarket RCTs are also possible (such as testing the comparative efficacy of two different drugs).

In stark contrast, clinical practice decisions about patient exposure to exogenous substances in the environment must typically be made *prior* to regulatory

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scrutiny of a compound and in the absence of risk-benefit analysis, because of our current regulatory and legal structure for governing manufactured chemicals (Figure below). Unlike the case with pharmaceuticals, the presence of a product on the shelf at the local chain store does not mean the product has been tested for toxicity and does not mean its benefits and harms have been compared. Advising patients about substances that lack regulatory oversight presents a very different decision context to the practicing clinician. Indeed, the vast majority of chemicals in commercial circulation have entered the marketplace without comprehensive and standardized information on their reproductive or other chronic toxicities.⁸

Ethical considerations also virtually preclude experimental human data from the evidence stream—one cannot experiment by exposing some people to polluted water and others to clean water and then see what happens. Instead, human evidence in environmental health sciences is collected by observing how exposures are differentially distributed in the real world and measuring health outcomes among populations more (often occupationally) or less exposed. While of scientific import, studies that link workplace and/or community exposures to adverse health outcomes represent a failure of prevention. For example, animal data on the carcinogenicity of a variety of chemicals have preceded as well as predicted later epidemiological observations in humans, and strong evidence exists that experimental results can be extrapolated qualitatively to human subjects.⁹ Whereas an experimental animal carcinogenic study typically lasts two years, it can take twenty years to get a result from a comparable human study.⁹ Moreover, the benefits of environmental chemicals are mostly not health related, exposures are unintentional, and they vary and may or may not be significant depending on the toxicity of the agent.


For all of these reasons, to protect their patients from harm related to environmental contaminants, clinicians must take timely action based on the same “upstream” in vivo and in vitro indicators of potential

harm that keep (or should keep) toxic drugs with no patient or population benefits off the market. The *Navigation Guide* is a systematic way to compile, rate, and sort the evidence stream to make it easy and quick for clinicians to confidently do just that.

The *Navigation Guide* is a systematic, transparent EBM methodology that is a key step in moving the emerging science in environmental health directly, rapidly, and easily into the exam room—where it can make a difference to the health of patients and their families. The urgent need to address the role of the environment on patient health is increasingly gaining traction in state and national professional societies of physicians and other clinical care providers (see related article by Gould and Russell in this issue). Uptake of the *Navigation Guide* by professional organizations will result in evidence profiles that provide uniform, simple, and transparent practice guidelines.

To this end, the American College of Obstetricians and Gynecologists District IX, which represents more than 5,000 California physicians, is actively engaged in the development of the *Navigation Guide* to support the clinical practice of its state and national fellows. Likewise, Planned Parenthood Federation of America, whose affiliates serve more than three million women and men per year throughout

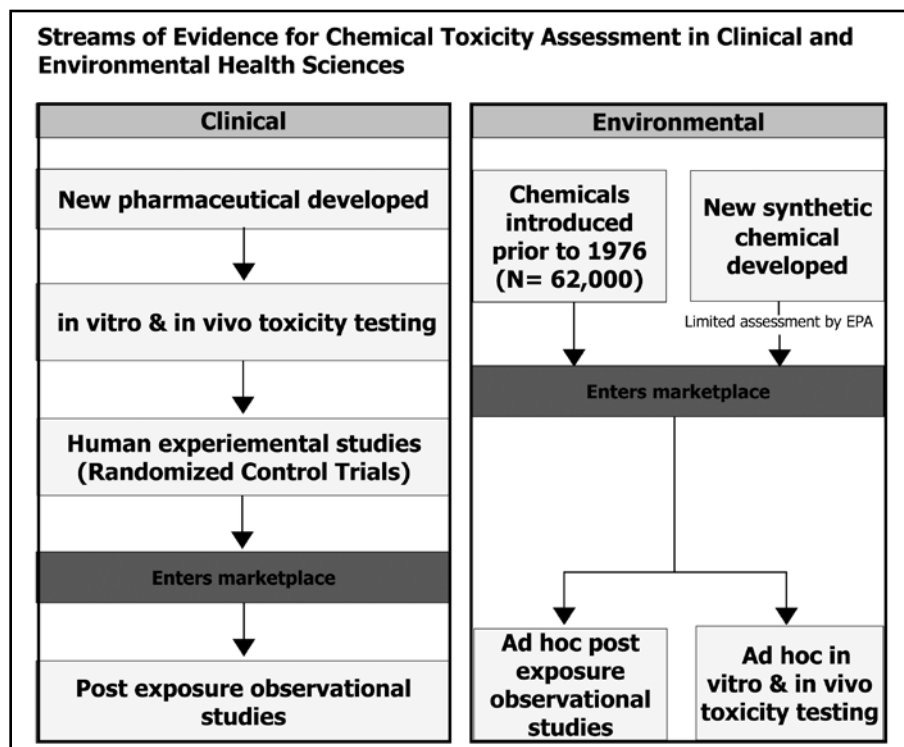
the U.S., is a key partner in developing the *Navigation Guide*.

The *Navigation Guide* is currently in the final stages of development. We anticipate its publication in late 2010 in a peer-reviewed journal. We hope that by 2011 it will begin to provide these and other professional organizations with a currently missing tool in a much larger effort to address the health impacts of widespread patient exposure to toxic substances in the environment. 

Patrice Sutton, MPH, is a research scientist in the Program on Reproductive Health and the Environment at UCSF. Jeanne Conry, MD, PhD, is chair of the American College of Obstetricians and Gynecologists, District IX, assistant physician in chief of Obstetrics and Gynecology at Kaiser Permanente North Valley. Pablo Rodriguez, MD, is associate chair of obstetrics and gynecology and clinical associate professor in the Department of Obstetrics and Gynecology at Brown Medical School and Women and Infants Hospital of Rhode Island. Tracey Woodruff, PhD, MPH, is associate professor and director of the Program on Reproductive Health and the Environment at UCSF. Visit <http://prhe.ucsf.edu>.

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Taking Action to Prevent Harm

County Medical Associations and Environmental Health

Robert Gould, MD, and Cindy Russell, MD

Members of SF-Bay Area county medical associations, largely based in the San Francisco Medical Society (SFMS) and Santa Clara County Medical Association (SCCMA), have increasingly recognized that providing for the best care for our patients and families involves addressing the environmental and public health issues that impact patient and community health. Commencing in the late 1990s, physician delegates to the CMA House of Delegates (HOD) tackled the issues posed by the hospital industry's own contribution to environmental pollution. These efforts led to CMA adopting policies that reduce and ultimately would eliminate a wide variety of hospital-based pollution. For example, the elimination of mercury and various PVC plastics in hospital practice will prevent impacts ranging from neurodevelopmental defects to cancer. Subsequently, CMA policy addressed the dangers of flame retardants and responded to the warnings in 2009 by the Endocrine Society about the health impacts of endocrine-disrupting chemicals and the need for timely action to prevent harm.

Recent CMA policies have moved beyond the targeting of specific toxic agents of concern to call for the adoption of public-health protective chemical policy to address the well-documented inadequacies of the existing regulatory framework, under which there is lack of toxicity testing for the vast majority of the more than 80,000 chemicals in commerce.

Reflecting the adage that "we are what we eat," CMA has passed many policies aimed at protecting vulnerable populations, including schoolchildren, farm workers, and agricultural communities, from

the dangers of pesticides. More recently, in response to alarming trends in obesity and diabetes, CMA has adopted comprehensive policies encouraging hospitals to take the lead in improving health of patients and the population overall by implementing food purchasing practices and menus that promote health and prevent disease. This includes eschewing non-sustainably-produced food such as meat from Concentrated Animal Feeding Operations (CAFOs) and instead choosing free-range animals, food grown on small and medium-sized local farms, and food grown according to organic or other methods that emphasize renewable resources, ecological diversity, and fair labor practices. In 2009, CMA responded to the rapidly accumulating evidence linking the overuse of antibiotics to serious outbreaks of drug-resistant infections by joining the rising voice of physician opposition to the use of non-therapeutic antibiotics in livestock.

CMA's current efforts to address its longstanding concern about the adverse impact of air pollution are linked to issues of fossil fuel use and the unfolding global health threats posed by climate change. CMA has called for hospitals to use the cleanest and most sustainable forms of energy and has encouraged physician support for binding reductions in national and global greenhouse emissions. In 2009, CMA adopted policy in support of "smart growth" strategies that protect health and endorsed the education of health professionals with resources, such as the Eco-Health Footprint Guide distributed by the Global Health and Safety Initiative, to help mitigate the impacts of health care system contributions to climate change and toxic pollution.

As exemplars of "First, do no harm," all of these policies provide a basis for physicians to help transform our institutions by addressing the environmental contributors to our patients' health. For example, members of SCCMA breathe life into these policies by working on hospital-based "green teams" and engaging hospitals through environmental audits and Grand Rounds about addressing climate change in the healthcare setting, based on information provided through a joint project of Practice Greenhealth, Health Care Without Harm, and Physicians for Social Responsibility.

Allied with parallel efforts by physicians in other states' medical associations, all of the foregoing measures have had an enormous impact on shaping the recent direction of American Medical Association (AMA), which has adopted policies promoting the incorporation of environmental health into medical education, supporting reforms in chemical policy, and addressing mercury exposure and other key environmental health issues. Most recently, AMA has made a major commitment to participate in actions to address climate change and has adopted a policy to promote the engagement of clinicians and policy makers in creating a healthy and sustainable food system.

As such, the work of CMA physicians has been successful in bringing diverse issues that had long been outside the range of patient care to the forefront of the concerns of mainstream medical practice. Our charge now is to transform this new awareness that permeates multiple levels of the health care system into the concrete measures needed to transform our institu-

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Vitamin D and Calcium

Increasing Evidence for Optimal Health

William B. Grant, PhD

Information on the health benefits of vitamin D and calcium for optimal health has been appearing at an increasing tempo during the past few years. The benefits include reduced risk of many chronic, infectious, and autoimmune diseases as well as adverse pregnancy and birth outcomes. The chronic diseases include many types of cancer, cardiovascular disease, congestive heart failure, diabetes mellitus type 2, osteoporosis, falls, and fractures. The infectious diseases include both bacteria infections (pneumonia, dental caries, periodontal disease, tuberculosis, sepsis/septicemia) and viral infections (Epstein-Barr virus, influenza type A). The autoimmune diseases include asthma, type I diabetes mellitus, multiple sclerosis, and perhaps rheumatoid arthritis. Adverse pregnancy outcomes include primary Cesarean-section delivery, preeclampsia, and infant health problems.

The mechanisms whereby vitamin D produces its benefits are reasonably well known. The classical benefit of vitamin D relates to absorption and metabolism of calcium; calcium intake increases the health benefits of vitamin D, not only for bones but also for cancer. For cancer, vitamin D helps with cell differentiation and destruction of rogue cells and also reduces angiogenesis around tumors and metastasis. For metabolic diseases, the mechanisms include increased insulin sensitivity and insulin production. For infectious diseases, vitamin D induces production of cathelicidin and defensins, which have antimicrobial and antiendotoxin activities.

From reviews of disease outcomes related to serum 25(OH)D levels, it has

been determined that serum 25(OH)D levels should be at least 40–60 ng/mL for optimal health. The mean population serum 25(OH)D levels in the United States are 16 ng/mL for African Americans, 21 ng/mL for Hispanic Americans, and 26 ng/mL for white Americans. African Americans have a 25 percent higher mortality rate than white Americans, and this difference can be explained in terms of lower serum 25(OH)D levels. Solar ultraviolet-B (UVB) radiation is a good source of vitamin D when the sun is high enough that the atmosphere transmits sufficient UVB. The way to take advantage of the sun as a source of vitamin D is to expose as much of the body as possible without sunscreen for ten to thirty minutes, depending on skin pigmentation, being careful not to turn pink or red or burn. While there is a risk of skin cancer or melanoma from solar or artificial UV, the risk can be minimized by not burning, not tanning excessively, and not wearing sunscreen when there is little danger of burning. For those living south of about 37°, those who develop nonmelanoma skin cancer have reduced risk of internal cancers since it is warm enough that they can produce enough vitamin D to greatly reduce risk of internal cancers.

Supplements represent an efficient way to obtain sufficient vitamin D. Each 1,000 IU/day translates to about 10 ng/mL increase in serum 25(OH)D levels for the average-sized person. Thus, African Americans should consider taking 3,000 IU/day while white Americans should consider taking 2,000 IU/day. The current dietary guideline, approximately 400 IU/day, was based on the amount of vitamin D in a spoonful of cod liver oil,


which prevented rickets; this amount has no other health benefits. The Institute of Medicine of the National Academies has formed a committee to review vitamin D and calcium requirements and is due to make its recommendation in May 2010.

There are few adverse effects of vitamin D. With whole-body UVB irradiance, one can make at least 10,000 IU/day in a short time. Adverse effects such as hypercalcemia have been found in general only for 20,000–40,000 IU/day for very long periods. However, those with certain diseases, such as adenoma of the parathyroid gland, granulomatous diseases, lymphoma, sarcoidosis, and tuberculosis, should limit their vitamin D intake or production due to the fact that the body's innate immune system produces too much 1,25-dihydroxyvitamin D in the serum, leading to hypercalcemia.

Several studies have examined how much mortality rates and economic burdens of disease could be lowered if population mean serum 25(OH)D levels were increased to 40–45 ng/mL. These studies were for Western Europe, Canada, the Netherlands, and the United States. The results generally showed that mortality rates could be reduced by about 15 percent, corresponding to about two additional years of life, and that the economic burden of disease could be reduced by about 10 percent.

During pregnancy and lactation, women should be taking about 6,000 IU/day. Bruce W. Hollis and Carol L. Wagner of Medical University of South Carolina recently completed a randomized controlled trial vitamin D supplementation for pregnant and nursing women and found that 2,000 IU/day was inadequate

and that there were no adverse effects with 6,000 IU/day.

For the text of *Vitamin D Scientists' Call to Action*, please go to www.grassrootshealth.net. It is also possible to order a home test kit for serum 25(OH) D levels for \$51. 

William B. Grant has a Ph.D. in physics (U.C. Berkeley), a thirty-year career in atmospheric studies, and a fourteen-year career in studying the risk modifying factors for chronic and infectious diseases with an emphasis on diet, ultraviolet irradiance, and vitamin D, starting with the first paper on diet as a risk factor for Alzheimer's disease. He has published more

than 180 papers in peer-reviewed journals. His bibliography can be found at <http://www.researcherid.com/rid/B-8311-2009>.

References


A full list of references is available online at www.sfms.org/environmentalhealth2010.

Disclosure

Dr. Grant receives funding from the UV Foundation (McLean, Virginia), the Sunlight Research Forum (Veldhoven), and Bio-Tech-Pharmaceutical (Fayetteville, Arkansas) and has previously received funding from the Vitamin D Society (Canada).

County Medical Associations

Continued from page 27...

tions and practices to meet the challenges of our time. Armed with the policies and evolving tools we have developed, California physicians can continue to make an enormous and critical impact. 

Dr. Robert Gould is associate pathologist, Kaiser San Jose; president of the San Francisco Bay Area Physicians for Social Responsibility; and a CMA delegate from the Santa Clara County Medical Association. Dr. Cindy Russell is a plastic and reconstructive surgeon and cochair of the Environmental Health Committee of the SCCMA and also a delegate to the CMA.

America Pushes to Overhaul Chemical Safety Law Congress Considers Stronger Regulation

Brendan Borrell

Nature 463, 599 (2010)

When it comes to commercial chemicals, the presumption of innocence may be coming to an end. The Toxic Substances Control Act (TSCA) allows the U.S. Environmental Protection Agency (EPA) to test chemicals that pose a health risk—but only when it has evidence of harm.

Since the law was passed in 1976, the agency has restricted just five chemicals, out of tens of thousands on the market. "It's a deeply flawed bill that needs to be rewritten," says Terry Davies, an environmental policy expert who worked on the act and is now at Resources for the Future, a nonprofit research organization in Washington, D.C.

Congress is likely to take up a bill this spring that would shift the burden of proof to manufacturers. Advocates for reform are pushing for potential legislation to include scientific advances in recent decades, such as how chemicals affect people at different ages and how multiple chemicals interact in the body.

The TSCA gave the EPA the authority to regulate chemicals and chemical mixtures not covered under laws for food, drugs, cosmetics, and pesticides. But the 62,000 chemicals that were already on the market in 1976 were exempted. Of 21,000 chemicals registered since 1976, only 15 percent

were submitted with any health and safety data, and the EPA has been able to require testing for only about 200 chemicals. About 95 percent of notices of new chemicals include confidential information, ostensibly to protect company trade secrets; this effectively prevents scientists outside the EPA from challenging the chemicals' safety.

With the TSCA essentially toothless, state officials have emerged as key watchdogs, banning chemicals in toys and elsewhere and supporting research into nontoxic alternatives. But in December, Lisa Jackson, the head of the EPA, told Congress that the TSCA needed to be "updated and strengthened." U.S. regulators should benefit from comprehensive chemical testing being conducted under Europe's Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) legislation, which came into force in June 2007.

Davies will be watching the reform efforts closely. "I'm quite optimistic that something will happen," he says. "How good it will be or how far it will go, I'm not so sure."

The President's Cancer Panel Diagnosing Shortcomings, Prescribing Precaution

In 2009, the overseeing panel of the National Cancer program held hearings on the environment and cancer, with the intent of producing a report on current science and policy. The report is due soon, but the panel's chair, LaSalle Leffall, Jr., MD, has provided introductory remarks in Reviews on Environmental Health that includes papers from the Panel meetings.

An excerpt: "The percentage of cancers that develop as a result of environmental exposures is not known. Furthermore, it is believed that existing estimates are based on outdated science and significantly underestimate the actual influence of the environment on cancer...infants, children, and adolescents are especially vulnerable to environmental contaminants. Prevention efforts in environmental cancer are impeded by insufficient research and ineffective regulations. The current regulatory approach in the U.S. is reactionary rather than precautionary and is impaired by inadequate funding and staffing, weak laws, decentralized and uneven enforcement, complex requirements, and industry influence."

Proceedings of the meetings can be found at <http://deainfo.nci.nih.gov/advisory/pcp/pcp.htm>

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Biomonitoring Updates

Measuring Chemical Exposures

Davis Baltz, MS, and Sharyle Patton

CDC's Fourth National Report on Human Exposure to Environmental Chemicals

In December 2009, the Centers for Disease Control and Prevention published its *Fourth National Report on Human Exposure to Environmental Chemicals* (www.cdc.gov/exposurereport/index.html). Biomonitoring, or biological monitoring, is the measurement of chemicals and their breakdown products or metabolites in human tissues and fluids.

Some portions of the CDC report have been published earlier but, taken together, the fourth edition is the most comprehensive assessment so far of U.S. residents' exposure to chemicals in the environment. Two hundred and twelve chemicals were measured in the blood and urine of some 2,400 Americans.


One of the provocative findings was the discovery that perchlorate was found in the urine of all study participants. Although perchlorate is a naturally occurring salt, most exposure occurs from anthropogenic sources such as rocket fuel, fireworks, and road flares. It has contaminated water supplies across the U.S. High levels of perchlorate adversely affect thyroid function, while effects from lower exposure are being studied. However, as with other chemicals, low levels of exposure during critical periods of fetal gestation can be particularly harmful to the developing neurological and other organ systems, and the timing of exposure can be a critical variable in understanding health effects.

Since the CDC began its *National Exposure Reports*, the number of chemicals has risen from twenty-seven chemicals in

the first report in 2001 to 116 chemicals in 2003 to 148 chemicals in 2005.

Although the number of tested chemicals is increasing, critics say that the federal effort could be improved. John Stephenson, GAO director for Natural Resources and Environment, recently testified before Congress and called for a coordinated research strategy among government agencies to ensure that biomonitoring collection and analyses are better coordinated with research needs.

Commenting about the fourth report, Senator Frank Lautenberg (D-NJ) noted that the CDC's findings highlight the need to reform the Toxic Substances Control Act (TSCA), the only U.S. law regulating industrial chemicals, which dates to 1976.

"Far too little is known about the hundreds of chemicals that end up in our bodies, and the EPA has far too little authority to deal with the chemicals that science has already proven dangerous," Lautenberg was quoted in a *Greenwire* article published Dec. 11, 2009. Lautenberg is expected to introduce legislation to reform TSCA in 2010. 

Davis Baltz, MS, is special projects advisor for the Collaborative on Health and the Environment.

Mind, Disrupted: How Toxic Chemicals May Change How We Think and Who We Are

The CDC biomonitoring survey supplies valuable information about chemical exposures in United States populations, but it does not convey individual results, nor are its analytical protocols designed to explore associations between exposures and health outcomes.

Addressing this gap, nongovernmental organizations have stepped forward to raise awareness about the significance of personal chemical body burdens by testing small groups of individuals who then often publicly speak about the toxic substances measured in their bodies and the impact these substances can have on human and ecosystem health.

One recent example of public interest biomonitoring is the Mind, Disrupted project by the Learning and Developmental Disabilities Initiative (LDDI), an international partnership of organizations concerned with environmental threats to neurological health. Twelve LDDI leaders and advocates were found to carry in their bodies bisphenol A, PBDEs, PFCs, and other chemicals associated in animal or human studies with neurological dysfunction.

The study participants are troubled by the number of children and adults in the United States currently diagnosed with learning and developmental disabilities. While increased awareness and improved diagnostic criteria play a role in the current figures, studies controlling for those factors imply that other culprits, such as chemical contaminants and gene-environment interactions, also likely play a role in the rising incidence of these diseases.

Participants also expressed concerns about inadequate federal policies governing environmental chemicals, calling for better neurotoxicity testing of chemicals, protection for those most vulnerable from exposures to neurotoxins, and readily understandable information about pathways of exposure.

Executive Director of the Learning
Continued on the following page...

Counting Roaches

Reducing Pesticide Exposures via Integrated Pest Management

Philip Landrigan, MD, MSc

Knowing all that we know about pesticides, what are the strategies that we as a society can adopt to reduce exposures? I tend to think that control of a toxic exposure such as pesticides ought to proceed on three levels. There are steps that need to be taken at the national level having to do with pesticide registration and standard setting; there are steps that need to be taken at the state or the city level; and there are steps that people can take in their own homes, pursuing the maxim that a parent is the CEO in his or her own home.

With regard to control of pesticides in the home, I'd like to tell you about something we did a few years ago in East Harlem, New York City. We undertook a rigorous evaluation in the East Harlem community to see if integrated pest management (IPM) could be successful in a mostly poor, 90 percent minority community. We partnered with two neighborhood health centers in East Harlem that are about ten blocks apart. We introduced IPM to the parents who were attending one clinic, and we taught a vigorous fire-safety and accident-prevention program to parents in the other. Parents in the second group continued to receive conventional pest control, in which the exterminator visited each month and sprayed the apartment. Over a year, we followed the two groups of families to see whether IPM could make a difference. At the end of the year, to achieve equity, we introduced everything to everyone.

The way the IPM worked was that when a mom who was pregnant came in to the clinic for her prenatal care, we offered to provide her IPM at no cost. If she agreed, we sent a handy person out to


the home to teach the mom and the family about how to clean up food residues. The handy person also spent a couple of hours closing cracks and crevices in the apartment, the portals through which cockroaches typically enter apartments.

We evaluated levels of pesticides in the homes that participated in the IPM program and compared them to levels of pesticides in the homes that received conventional pesticide spraying. We also engaged in the interesting exercise of conducting roach censuses, which we did by taking a sticky pad about the size of a piece of computer paper and placing it under the kitchen sink once a month for twenty-four hours, then doing a body count to see how many roaches actually accumulated.

We found three things. First, the homes that swore off chemical pesticides and went to integrated pest management decreased their indoor contamination with chemical pesticides by 90 percent. Second, in homes that went to IPM there was a 50 percent reduction in the numbers of roaches actually counted as compared to the homes that used traditional pest control, which had no reduction in roach counts. This confirms that traditional pesticides simply chase the roaches from one apartment to another, like the coming and going of the tide.

Finally, by year's end there was virtually no cost difference between the two. There was a one-time, up-front cost per unit in the IPM homes to bring the handy person in to do the repairs, and then after that the monthly costs in the IPM homes were much less because there was no need to purchase expensive pesticides. Thus, by the end of one year, the


costs were equal, and in future years we anticipate that IPM homes would have lower costs than conventionally treated homes.

So IPM works. It's doable. It's something that I commend to you and wish you well with. In fact, the City of New York was so impressed with this approach and with the cost savings that resulted from it that it has made IPM the standard of practice in New York City public housing. 

Philip Landrigan, MD, MSc, is director of the Children's Environmental Health Center and professor of pediatrics and chair of the Department of Preventive Medicine at Mount Sinai School of Medicine.

*Biomonitoring Updates
Continued from page 31...*

Disabilities Association of New York State and project participant Stephen Boese said, "As a father of four boys, one of whom lived a short life of overwhelming disability, I am keenly aware that prevention of learning and developmental disabilities is both an individual and a community responsibility. The enormous rise in the incidence of these disabilities is coupled with a huge increase and proliferation of chemicals in everyday consumer products. These chemicals are largely untested for human safety and largely unknown to the public."

The *Mind, Disrupted* report was released February 4, 2010: www.minddisrupted.org. 

Sharyle Patton directs the Commonweal Biomonitoring Resource Center in Bolinas, California.

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CPMC

Michael Rokeach, MD



CPMC is proud to announce the opening of the DROP-IN Fine Needle Aspiration Biopsy (FNA) Service, supported by the Department of Pathology. Under the directorship of Dr. Ian Jaffee and with the support of Dr. Richard Garcia-Kennedy and Dr. Shine Yun, all board-certified experts in cytopathology, the FNA Service provides same-day availability on the California Campus (3700 California St., fourth floor), from 9:00 a.m. to 4:00 p.m., Monday through Friday. The FNA Service provides diagnostic aspiration of superficial, palpable masses of all body sites. For coordinating both schedules and same-day drop-in requests, please contact Client Services at (215) 600-2200.

The Forbes Norris MDA/ALS Research and Treatment Center has won the Program of the Year award from the California Speech-Language-Hearing Association. The CSHA is a nonprofit organization dedicated to helping children and adults with communication challenges. The award is one of the highest that CSHA gives out and is a fitting tribute to the extraordinary work that the staff at Forbes Norris do every single day.

CPMC physician Dr. Nadine Burke, medical director of the Bayview Child Health Center in Bayview Hunters Point, was recently profiled in an article in the Style section of the *San Francisco Chronicle*. The article featured a day in the practice of Dr. Burke and highlighted many of CPMC's successes. Dr. Burke was also one of three doctors recently honored at the Medical Center's annual Wishes for Wellness fund-raising gala for their contributions to health. Dr. Burke is a U.C. Berkeley-trained physician with a master's degree in public health from Harvard. To review the complete article, you may log onto www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2010/02/19/LVG-01BVMCV.DTL.

Kaiser

Robert Mithun, MD



The San Francisco Asthma Task Force formed in 2001 when community activists, many from Bayview Hunters Point, joined forces with the Board of Supervisors to create a citywide response to an asthma epidemic. Kaiser Permanente San Francisco has been an active partner since the beginning, supporting projects that prevent and control asthma, such as reducing exposure to environmental triggers and promoting medical management. Our environmental advocacy work includes improving outdoor and indoor air quality in homes, schools, and child care settings, as well as coordinating efforts with local agency and community partners. These projects include a new Renters' Rights Clinic, offering free legal advice to tenants in the Bayview Hunters Point district as well as the promotion of consumer access to green cleaning products that do not contain known asthmagens. Additionally, plans are underway for training at a Housing Authority family development in Visitacion Valley to reduce pesticide use and cockroach infestations. The Asthma Task Force also supported a project to improve the capacity of Housing Authority staff to investigate mold and water infiltration in housing units by using thermographic (infrared) cameras. Work in schools continues with the San Francisco Unified School District (SFUSD) to improve indoor air quality by transitioning to green classroom and custodial cleaning products and by implementing the USEPA Tools for Schools Program, including recommendations to reduce the use of bleach and to provide access to registered disinfectants that are safer for those with asthma. Ongoing participation in the Bay Area Environmental Health Collaborative advocating for Air District regulatory strategies to reduce cumulative air pollution impacts on disproportionately burdened communities will improve overall outdoor air quality. For more information, visit www.sfgov.org/asthma.

UCSF

Elena Gates, MD



Health is influenced by myriad environments, including clinical settings, family, and society. In this issue, you'll find several examples including an evidence-based tool called the Navigation Guide to bridge the gap between clinical practice and environmental health science, and an online resource called Toxic Matters (see page 26). Recently launched by UCSF, Toxic Matters was created to facilitate smarter decisions about substances that can harm general and reproductive health. UCSF is constructing a medical center at Mission Bay, incorporating evidence-based design discoveries that demonstrate that buildings can affect healing, safety, and well-being. Targeting LEED gold certification, the new hospitals incorporate green design and soothing visuals. Therapeutic roof gardens will comprise part of the largest green space planned for an urban U.S. hospital. Patient rooms will include materials undergoing an unprecedented assessment to eliminate most known toxic elements, and the percentage of workstations with daylight will rank among the highest in U.S. hospitals.

For the past few years, UCSF pediatricians and researchers Robert Lustig, MD, and Michele Mietus-Snyder, MD, have focused on the "toxic" environment surrounding children that encourages unhealthy food choices and sedentary lifestyles. Their 2008 published article describes neuroendocrine survival mechanisms in the brain designed to prevent starvation (hypothalamus), heighten reward (nucleus accumbens), and attenuate stress (amygdala). This "limbic triangle" makes weight gain in modern times almost inevitable, and interventions based on cognitive education alone likely to fail. "An integrated approach that alters the family environment and a societal commitment to alter the food and built environments will both be necessary to combat obesity," said Lustig.

St. Mary's

Richard Podolin, MD



Nearly ten years ago, St. Mary's Medical Center established an Environmental Action Committee (EAC), and the group has been meeting ever since. The EAC is comprised of employees from numerous departments, from purchasing to engineering to our food service, who are committed to making ecologically informed decisions that will both support our medical center and protect our environment. For example, the EAC tries to purchase supplies that are made from recyclable content or that can be recycled after use. It is also the EAC's mission to raise awareness about recycling and other environmental issues within our hospital community. St. Mary's now recycles medical supplies with Ascent Healthcare Solutions, a company that reprocesses and remanufactures medical supplies originally designed for single use. We recycle office supplies, electronic equipment, and waste containers. Our food service/nutrition department serves food in paper and biodegradable materials only, and it purchases fair-trade coffee. In our meetings, water is served in pitchers, not plastic bottles, and we are planning to start a composting program soon. The marketing department has taken on the challenge of reducing waste by distributing reusable bags (made of 100-percent recyclable material) at patient and marketing events.

All these environmental efforts are paying off. In 2009, 25 percent of all waste at St. Mary's was recycled. We cut down water use by more than 3 million gallons in a single year. We are proud of these accomplishments, but we are also committed to expanding our efforts. St. Mary's has applied to the San Francisco Department of the Environment for a grant to assist in the purchase of a used, 40-yard, recyclable material compactor. All new construction and renovations will feature low-flow flushometer toilets and energy-efficient lighting. We see these efforts as the logical extension of our role as stewards of the health of our community.

Veterans

Diana Nicoll, MD, PhD, MPA



People with symptoms of depression in middle age have a significantly greater risk in old age of being physically disabled or unable to carry out tasks of daily living, according to a study led by researchers at the San Francisco VA Medical Center and the University of California, San Francisco.

The study followed 7,207 adults who enrolled in the Health and Retirement Study in 1992, when they were aged 50 to 61. The research is an ongoing national prospective study of health, income, and wealth. The authors found that by 2006, 45 percent of the 877 participants who reported significant depressive symptoms in 1992 had persistent difficulty with mobility or activities of daily

living, compared to 23 percent of the nondepressed participants.

The link between depression and increased risk of later disability remained significant even after the researchers adjusted for age, gender, physical condition, health status, socioeconomic status, and other factors.

Lead author Kenneth E. Covinsky, MD, MPH, a geriatrician at SFVAMC, says that the study was not designed to examine the reasons for the link. It is not clear, he says, whether treating middle-aged depression with antidepressive medications will help prevent later disability. "It might make just as much sense to think about mechanisms by which depressed people might become physically disabled," he says. "For example, we know that people with depression are socially isolated, which in turn compromises their ability to live independently. They are also less physically active, which has a direct effect on health. So we might want to include interventions that improve social functioning and level of physical activity." The study appears in the online Early View section of the *Journal of the American Geriatrics Society*.

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Steve Heilig, MPH

Slow Death by Rubber Duck

Slow Death by Rubber Duck

The Secret Danger of Everyday Things

By Rick Smith and Bruce Lourie

(Counterpoint, 336 pages, \$25)

Poor Marge Simpson. In a recent episode of *The Simpsons*, the iconic but insecure cartoon housewife made the mistake of using nonstick cookware and offering plastic cups with the wrong number stamped on them. The other mothers at her party grabbed their children and ran as if a bomb had gone off. Another party ruined.

Were the parental panic and Marge's ostracism justified? Does the threatening appearance of chemicals such as PFCs (in nonstick pans) and BPA (in plastics) on America's most renowned television series mean concern about toxics has finally gone mainstream?

Panic, no; but concern and action, yes, argue Canadian environmentalists Rick Smith and Bruce Lourie in *Slow Death by Rubber Duck*, for "there is no separation between environmental issues and health issues." Marge's guests got it right that "children are most at risk to the many serious ailments linked to toxic chemicals," they argue, including "asthma, autism, attention deficit hyperactivity disorder (ADHD), obesity, and reproductive disorders, among others." Add in serious diseases arising later in life, such as Parkinson's and Alzheimer's plus some cancers, and it's a frightening scenario. So, what to do?

Self-education is an essential first step, and this book is a good resource for that. Chemicals increasingly linked to health problems are found in "toys, baby bottles, kid's pajamas, popcorn bags, mattresses, and thousands of other products we assume to be safe." What might that mean? Smith and Lourie trace concerns about health-threatening chemicals in consumer products to the use of radium in luminescent pocket watches made for soldiers in World War I. When women painting the radium onto the watch faces started to get ill, they sued, and people threw the watches away—but the five woman plaintiffs all died of radiation-induced cancer. Phosphorus in matches, mercury in hats—the resulting dementia resulted in the term "mad as a hatter"—toxic lead in paint, and other examples resulted in new safety laws and agencies. But most chemicals have escaped serious study and regulation.

Thus, to date most industrial chemicals have been assumed innocent until proven guilty. While research has taken long strides in showing how many of the roughly 80,000 industrial chemical in use can impact animals and humans, showing definitive proof is a long, complex scientific process. And thus what one advocate herein

terms our ongoing "slow poisoning," since "we're all marinating in chemicals every day."

The political dynamic is equally if not more difficult. The large and powerful chemical industry maintains what the authors term a "don't worry, be happy" argument, similar to that taken by tobacco spokespeople for decades. Every step of the way, lobbyists and their front groups tend to fight any restrictions on the use of their products, or any negative press supporting such restrictions.

The bulk of *Slow Poisoning by Rubber Duck* is seven case studies regarding phthalates, PCBs, mercury, antibacterial products, pesticides, and, yes, Teflon on pans and BPA in plastics. Most of these stories have been told in detail before, but the summaries here are clear and compelling.

In a nice twist, the authors conducted mini "toxic experiments" on themselves. Smith did all he could to first avoid and then expose himself to "normal" phthalate-containing products for twenty-four hours each, and he had his urine monitored for the chemicals in question. "I was actually shocked at the results," he notes. "My little experiment showed how amazingly easy it is to dramatically crank up levels of MEP (one problematic phthalate) after a simple change in toiletries for two days. Who knew that conditioning your hair could be hazardous to your health?"

San Francisco started a legislative restriction on phthalates that moved to the state and then national levels, as told by the authors. New chemical regulations in Europe are driving even American-based chemical companies to clean up their products. So, at least in some arenas, healthy progress is underway—but much more is needed.

Smith and Lourie provide advice to consumers on how to reduce exposure to each of the troubling chemicals they explore. "I am not a chemophobe," avers Smith. "I love chemicals. Most of the chemicals in my life . . . are just dandy. . . . What I object to are the chemicals like triclosan that aren't necessary, are possibly dangerous, and are foisted on us every day without our knowledge or consent." Anybody who reads this book will likely come to object to that as well. **sfm**

Steve Heilig, MPH, is director of public health and education for the San Francisco Medical Society. A previous version of this review appeared in the San Francisco Chronicle.

Steve Heilig, MPH

Antibiotics (Still) at Risk

“How You Gonna Keep ‘Em Down on the Farm?”

Bacteria are the likely the best creatures known for teaching and demonstrating evolution in action. They reproduce so fast and are so responsive to environmental selection pressures that one can alter a colony’s genetics in very little time. It’s literally a textbook case of Darwinian survival of the fittest.

Of course, that’s not always a good thing for other species. And with bacteria and antibiotics, it’s been war from the start. Drug-resistant strains and colonies began to arise as soon as antibiotics came online; the race to keep ahead of them is constant and escalating. In fact, Alexander Fleming, who discovered penicillin, warned about just this threat in his 1945 Nobel Prize address.

Antibiotic-resistant infections kill tens of thousands of Americans each year and have been estimated to cost the U.S. up to \$34 billion annually. Brad Spellberg, MD, author of *Rising Plague*, warns, “We are seeing infections . . . that are literally resistant to every antibiotic that is FDA approved. These are untreatable infections. This is the first time since 1936, the year sulfa hit the market in the U.S., that we have had this problem.”

Experts have long warned that we use too many antibiotics in agriculture, as growth promoters and prophylaxis in meat production. The concern was that this reservoir might spill over into human infections. According to the Union of Concerned Scientists, 70 percent of antibiotics used in this country are fed to healthy livestock; another 14 percent treat sick livestock. The remaining 16 percent go to people and pets. In recent years, some resistant strains of human pathogens have found their way from feedlots and farms into hospitals and humans. As an old song asked, “How you gonna keep ‘em down on the farm?”

Apparently, we cannot. A 2002 *Clinical Infectious Diseases* meta-analysis of more than 500 studies found that “many lines of evidence link antibiotic-resistant human infections to food-borne pathogens of animal origin.” The Institute of Medicine concluded in 2003, “Clearly, a decrease in the inappropriate use of antimicrobials in human medicine alone is not enough. Substantial efforts must be made to decrease inappropriate overuse in animals and agriculture as well.”

That’s a brief summary of expert opinion and evidence. In light of this, the European Union has banned the use of antibiotics in livestock except to treat illness—and the evidence has grown


stronger. The most intensively studied country, Denmark, saw a 50 percent decrease in total antibiotic use without negative impacts on farmers or consumers but a large public health benefit. But what about in the USA?

In 2002, the SFMS convened a conference on this issue, co-chaired by two living legends of medicine and public health, Philip Lee, MD, and Lester Breslow, MD. One result of that meeting was a policy resolution urging the phaseout of routine use of antibiotics in agriculture; this policy was adopted by the CMA and AMA. But, to be frank, not much has changed in practice.

The latest federal legislation introduced to stop the use of human medicine-important antibiotics is called PAMTA, the Preservation of Antibiotics for Medical Treatment Act (HR 1549/S.619). Hundreds of health, medical, and consumer and environmental groups have endorsed it.

And what do farmers think? Many smaller producers, especially in the “organic”-type sector, already forego antibiotics unless absolutely necessary. But “big agriculture” lobbyists fight any restrictions. They have argued that restrictions in Europe have led to outbreaks and higher costs, although authorities there say that this is a “creative” and untrue rumor. And now even the USDA holds that the cost savings of using antibiotics are a mirage in most cases.

The sad precedent of the tobacco wars is conjured: Evidence of a severe health threat is strong; corrective measure are proposed and endorsed; political lobbying gridlocks the remedy. The risk keeps growing, and people suffer and die. PAMTA, at a minimum, needs to be enacted. Even more is likely warranted. Will our leaders listen before uncontrollable disaster strikes?

Martin Blaser, MD, a past president of the Infectious Diseases Society of America, warns of “lethal pandemics” if antibiotic resistance is not brought under control. In fact, some longtime observers of this threat fear that, rather than a nuclear or other threat, it might well be our smallest, longtime, invisible enemies that prove the end of humanity, bringing about our demise, as T. S. Eliot warned, “not with a bang but a whimper.” 

For more information, see www.keepantibioticsworking.com.

Edgar Wayburn, MD

Dr. Edgar Wayburn ended his long and distinguished career on March 5th, in his home in San Francisco. He was 103. The Sierra Club referred to him as the “twentieth-century John Muir.” The San Francisco Chronicle called him a “quiet hero.” His conservation efforts led him and his wife Peggy to develop the Redwoods National Park and to lead the Sierra Club in its successful campaign to protect the Alaskan wilderness. Dr. Wayburn, along with colleagues Amy Meyer and Phil Burton, was instrumental in preserving the most significant wild space in the Bay Area, the Golden Gate National Recreation Area (GGNRA).

I knew Ed as a colleague and physician for more than thirty years. It’s not as well recognized that, in addition to his remarkable accomplishments in the environmental world, Dr. Wayburn had an illustrious career as an internist in San Francisco. During fifty-two years of private practice, he was on the staff of both Stanford and UCSF, ending his career at California Pacific in 1985. He served the San Francisco medical community as Medical Society president in 1965 and for many years represented SFMS at the CMA’s House of Delegates. He also served as a member of the board of trustees of California Pacific Medical Center in the early 1980s.

Ed was born in Macon, Georgia. He completed his undergraduate work at the University of Georgia and headed to Harvard for medical school, graduating in 1929. He was not a typical child of the South. His mother was from San Francisco and, from what we can tell from the Macon newspapers, was quite a radical for her times. His father died when he was two years old. Trips to the Bay Area with his mother may explain why, after completing a residency in Germany, he moved to San Francisco in 1933. Dr. Wayburn began his medical practice with his uncle, Dr. Ernest Voorsanger, a tuberculosis and early pulmonary specialist. During World War II, he was stationed in England with the Army Air Corps. At the close of the war, he oversaw one of largest chest X-ray screening programs ever attempted, imaging every GI returning from the European theater.

Returning to San Francisco after the war, he met Peggy Elliot, the Manhattan copywriter who would become his wife and partner for the next fifty-five years. He arrived for their first date dressed for a day in the woods. Then they went for a hike in Marin. At the time, she would tell me years later, she didn’t have anything but her fancy Madison Avenue shoes, but she got some good hiking boots the next day, because they went hiking the second weekend as well.

I joined Ed in the practice of medicine in 1979. Georgia boy to Tennessee boy, we formed an immediate bond. Our relationship was founded on mutual respect and trust, cemented by a handshake, nurtured with frequent lunches and hikes in Bolinas. He had already served three terms as president of the Sierra Club, and his work on the Redwoods National Park, and even the GGN-

William S. Andereck, MD




RA, had already been done. Still, he was only 73 at the time, and he was needed in Alaska. I watched in awe as each June for the next ten years, he would pack his family up and take off to tour the wilds of the forty-ninth state. Patient, persistent, and focused, he developed and guided the strategy that was to result in the Alaska Lands Act. All the while, he continued to see his patients each afternoon after spending the morning with Sierra Club staffers.

Ed received many awards in his distinguished career, including the Albert Schweitzer Prize for Humanitarianism, presented by President Clinton in 1995. One he held dearly was his fifty-year member pin from the San Francisco Medical Society. I was with him in 1983 when he received his award with full pomp and circumstance. Subsequently, he realized that he had not joined the Medical Society until 1934, one year after starting practice. So Ed, in his proper, patient, and methodical way, convinced the Society to issue him a second fifty-year pin at its awards ceremony the following year. He was quite proud of the fact that he had earned two fifty-year pins!

Vision is not a quality you can appreciate in a man until you have known him for a long time. A story he once told me exemplifies that vision. After President Carter signed the Golden Gate National Recreation Area into law, Ed was sitting in a suite in the Fairmont with the bill’s main sponsor, Phil Burton. This was in 1972, at the end of the Vietnam era and the height of the Cold War. Phil, who, according to Ed, was already on his fifth or sixth Stoli by then, raised his glass: “To that provision you stuck in the bill,” he exclaimed, “that if the Army should ever, for any reason, decide to decommission the Presidio, it would revert automatically to the GGNRA!” Ed remembers thinking he would never live to see that day.

Ed Wayburn not only lived to see the Presidio become a National Park but to see the rest of his work celebrated throughout the world. I have lost a mentor. The environment has lost a friend. The medical community of San Francisco has been blessed to have had a true hero in its midst.

Ed and Peggy had a son, William; three daughters, Cynthia, Laurie, and Diana; and three grandchildren. 

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