

**Sylvia R. Karasu M.D.**

The Gravity of Weight

It's Not Exactly Better Living Through Chemistry

Can environmental chemical pollutants lead to weight gain?

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The slogan, “Better Living Through Chemistry,” was a popular variant of an advertising slogan by the DuPont Company that was used from the mid 1930s until the early 1980s. (Apparently now it is also the name of a 2013 film, directed by Moore and Posamentier, and featuring, among others, Jane Fonda and Ray Liotta.) For our purposes here, we’ll use it to call attention to the complex relationship of environmental pollutants to weight. We are talking about endocrine disrupting chemicals, i.e., potentially toxic synthetic compounds that may interfere with the regulation of our body’s complex endocrinological (i.e. hormonal) systems or even possibly our circadian rhythms. They include dioxins, polychlorinated biphenyls (PCBs), brominated flame retardants, organochlorine pesticides, phthalates used to manufacture shampoos, cosmetics, and nail polish as well as bisphenol A used in the manufacture of plastic food and beverage containers, among others. These are chemicals that are found pervasively throughout our environment, including potentially in our water and food supply and now,

All things are poison, depending on the dose, said Paracelsus.

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even in a mother's breast milk! There is some indication these chemicals may play a role in the burgeoning worldwide obesity epidemic.

A series of articles in this June's issue of the prestigious journal *Obesity* has brought the controversy front and center. An editorial by David B. Allison, Ph.D., Quetelet Endowed Professor, and his colleague Julia Gohlke, both at the University of Alabama at Birmingham, discusses some of the complex issues involved. They quote from Paracelsus, a 16th physician and all-around Renaissance man, who had said, "All things are poison, and nothing is without poison; only the dose makes a thing not be poison." In summarizing the research presented in the Journal, Gohlke and Allison explain that different scientists can look at the same data and have "divergent interpretations." For example, Heindel and Schug, believe that environmental chemicals can be considered obesogens (i.e. they cause weight gain over time on exposure), particularly when exposure is during the "critically sensitive" "plastic" phase of early development and in those who are already overweight or obese because these chemicals are stored in fat tissue (i.e., the more fat, the more exposure.) They note that there are "now nearly 20 chemicals shown to cause long-term weight gain based on exposures during critical periods of development due to their ability to disrupt normal hormone and neuronal signaling pathways." Others, such as Sharpe and Drake, refute such a conclusion. They believe that the association of human obesity to so-called environmental "obesogenic chemicals" may be circumstantial. They believe that our fast food diets may have more of a contributory role. Still others are not sure and want more evidence.

Compounding the difficulties is that randomized controlled studies, the *sine qua non* of scientific investigation, may be unrealistic because of ethical issues of knowingly exposing a population to a potentially toxic chemical--weight-related or not. An example would be determining the effects of breastfeeding on exposure. Furthermore, causality is extremely difficult to prove: there are so many confounding, uncontrolled variables, such as contributions from diet (e.g. fat intake may be a factor in amount of exposure), length of exposure required for an effect, and even when that exposure takes place. There are also male and female differences in the effects of exposure so that any research must take gender differences into account. Furthermore, we are exposed to a toxic soup of these compounds in

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someone.

the environment so it may be difficult to separate out how exposure to particular ones affects

Researchers, though, are trying. For example, Juliette Legler, in this issue of *Obesity*, reports on the OBELIX Study, which stands for "Obesogenic endocrine disrupting chemicals: linking prenatal exposure to the development of obesity in later life" that is being conducted in four European countries. The strength of that investigation is that it is studying "the same chemicals in an integrated toxicological and epidemiological approach," that includes research involving mothers and their children followed over eight years, as well as animal experiments with mice exposed to endocrine disrupting chemicals. Legler and her

colleagues have found that there is an inverse relationship between a marker for PCB in infant cord blood and birth weight, not unlike the low birth weights and later life obesity found in some of the Dutch population exposed to starvation during the years of World War II.



Plastic bottles have endocrine disruptors in them that may affect our weight.

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Bottom line: we really do not completely understand why obesity rates have reached epidemic proportions in the past thirty years throughout the world. We do know that overweight and obesity result from a complex interaction of genetic, environmental, behavioral, and metabolic factors, among many others. How much a role endocrine disrupting chemicals have in weight gain may still be open to question. Say Gohlke and Allison, “Despite the divergent interpretations of individual studies and the differences in overall conclusions drawn...it is clear we have imperfect knowledge.”

About the Author



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In Print: *The Gravity of Weight: A Clinical Guide to Weight Loss and Maintenance*

Online: my own website

