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BODY BURDEN

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Toxic chemicals, both naturally occurring and man-made, often get into the human body. We may inhale them, swallow them in contaminated food or water, or in some cases, absorb them through skin. A woman who is pregnant may pass them to her developing fetus through the placenta. The term "body burden "refers to the total amount of these chemicals that are present in the human body at a given point in time. Sometimes it is also useful to consider the body burden of a specific, single chemical, like, for example, lead, mercury, or dioxin.

Some chemicals or their breakdown products (metabolites) lodge in our bodies for only a short while before being excreted, but continuous exposure to such chemicals can create a "persistent" body burden. Arsenic, for example, is mostly excreted within 72 hours of exposure. Other chemicals, however, are not readily excreted and can remain for years in our blood, adipose (fat) tissue, semen, muscle, bone, brain tissue, or other organs. Chlorinated pesticides, such as DDT, can remain in the body for 50 years.

Scientists estimate that everyone alive today carries within her or his body at least 700 contaminants, most of which have not been well studied (Onstot and others). This is true whether we live in a rural or isolated island, in the middle of a large city, or near an industrialized area. Because many chemicals have the ability to attach to dust particles and/or catch air and water currents and travel far from where they are produced or used, the globe is bathed in a chemical soup. Our bodies have no alternative but to absorb these chemicals and sometimes store them for long periods of time. Whether we live in Maldives or New York, Somalia, or Johannesburg, all our bodies are receptacles for a multitude of industrial chemicals. Wherever we live, we all live in a chemically contaminated neighborhood.

Some of the chemicals residing in our bodies are pesticides, and some are used in or produced by other forms of industrial production. Many are found in a wide variety of consumer products. Some chemicals like dioxins and furans are created unintentionally by

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industrial processes using chlorine and from the manufacture and incineration of certain plastics. Scientists estimate that there are many other unintentionally created by-products which have not yet been "discovered" since no tests have yet been developed that would fully identify or describe these by-products.

Humans are exposed to chemicals through the food we eat, the air we breathe, and the water we drink and bathe in. Chemicals often coat the surface of dust particles, which we handle or inhale. Contaminated dust is an especially important route of exposure for children who commonly put their hands into their mouths. We are also exposed to hundreds of chemicals in everyday products we use. Paints and varnishes, gasoline, glues, cosmetics, clothes dry-cleaned with solvents, plastic food containers, and home and garden pesticides are just a few examples.
Chemicals can have different effects in people or in wildlife, depending on the amount, timing, duration, and pattern of exposure as well as the properties of the specific chemical. Chemicals can have toxic effects through a variety of mechanisms.

For example, sometimes a chemical attacks and damages or kills cells or tissues in the body. Some chemicals attack the genetic material in the nucleus of a cell, causing damage directly to the DNA, which may create an inheritable defect that is passed on to the next generation. This can lead to gene mutations, which can set in motion a sequence of events leading to cancer, birth defects, developmental or reproductive disorders. Chemicals that cause cancer are called carcinogens. Chemicals that cause birth defects are called teratogens. Chemicals that damage the normal development of the fetus, infant, or child, or damage our reproductive tissues are called developmental/reproductive toxicants. Some chemicals can cause damage through their ability to interfere with normal hormone function. These chemicals are called endocrine disrupters.

Through these various mechanisms, toxic chemicals can cause a long list of health problems. They include, for example, direct damage to the lungs, liver, kidney, bones, blood, brain and other nerves, and the reproductive systems. There are hundreds of adverse health effects that can arise from exposures to chemicals or metals. These potential effects include cancer; high blood pressure; asthma; deficits in attention, memory, learning, and IQ; Parkinson's-like diseases; infertility; shortened lactation; endometriosis; peripheral nerve damage; and dysfunctional immune systems. For example, dioxin is a carcinogen and fetal exposures to dioxin interfere with normal development, including the immune system.

Fetal exposure to polychlorinated biphenyls (PCBs) is related to behavioral and cognition problems.. The immune systems of children in some areas of the far north are unable to produce enough antibodies to make vaccinations effective. Since these children and their mothers carry large chemical body burdens, a chemical link to this problem is likely. Fetal exposure to mercury causes attention, memory, and learning problems later in life. Brain development is also impaired in fetuses and infants exposed to lead.

In general, there is no readily accessible way to know your own body burden. Even if you could learn about your own body burden, you may not find the information useful. Your doctor in general cannot prescribe treatments that will lower the level of chemicals in your body. Finding out about your community body burden, however, is useful, and can lead you and your neighbors to take actions to lower your chemical exposures.

In general, you can find out more about the chemicals in the fish you eat than you can discover about the chemicals stored in your body. In other countries, Sweden for example, body burden monitoring is more extensive, and the government tracks how well it is doing in reducing people's exposures to environmental chemicals by watching the body burdens go down. Body burden monitoring gives them a report card on their primary prevention activities. Body burden monitoring also can serve as an early warning system that identifies new chemicals that are increasing in people, and that the government should pay attention to.

Since we have the rights to know about what chemicals are in our air, water, soil, food and products we use daily, it makes sense that we should have the right to know about the chemicals we carry in our bodies. We should take a lesson from the Swedes and establish extensive community-based body burden monitoring programs around the world.

Testing the body burden tells us something about what chemicals we have been exposed to. It usually tells us almost nothing about whether those exposures are responsible for any health problems. However a single body burden test, or, better yet, community-based monitoring, may indicate a great deal about the overall state of our environment and public health.

There is no general agreement about useful or safe methods for reducing body burdens. The best course is long-term prevention. Contamination of future

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generations by toxic chemicals can be prevented by working together to:

1) Eliminate the most dangerous persistent chemicals that bioaccumulate (concentrate more as they get higher in the food chain);
2) Develop alternative production methods that use non-toxic materials, and
3) Ensure that communities, national governments and international agencies take a precautionary approach when it comes to chemicals released into our air, water, and soil.

Changes in lifestyles may prevent some exposures. Recent studies of chemical body burdens in the state of Washington have found that children who ate organic food and who were not exposed to pesticides in their homes had significantly lower body burdens.
Some limited research shows that body burdens of some contaminants stored in fat can be lowered by a combination of special diets, exercise, and saunas. But data are very limited and preliminary. When some metals, like lead or mercury, are present in the body at fairly high levels, "chelating agents" are sometimes used to lower the total body burden of that particular metal. However, "chelation" treatments are somewhat controversial with potential side effects and have not been proven to consistently reduce toxic impacts of exposure. For example, one study showed that a chelating agent used in children with moderately elevated lead levels did not improve neuralgic performance.

References

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