Endocrine Disruptors

Fact Sheet

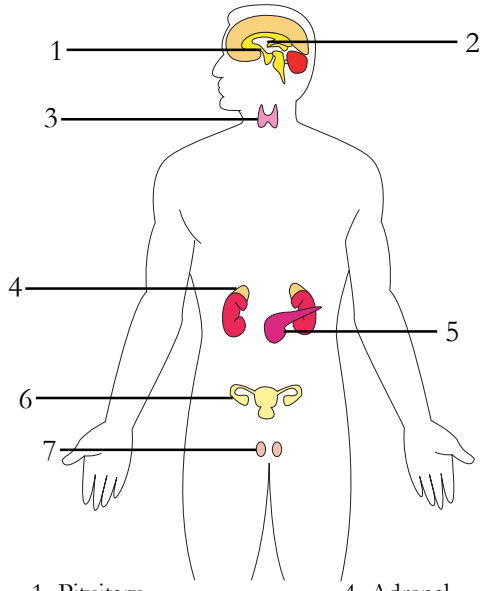
What is the Endocrine System?

The endocrine system, also referred to as the hormone system, is made up of the following components:

- glands located throughout the body
- hormones which are produced and released by the glands into the bloodstream
- receptors in the various target organs and tissues which recognize and respond to the hormones.

The function of the endocrine system is to regulate a wide range of biological processes from conception through old age. Some of these processes include control of blood sugar, growth and function of reproductive systems, and regulation of metabolism. The figure below shows major parts of the endocrine system.

Endocrine Glands



1. Pituitary
2. Hypothalamus
3. Thyroid and Parathyroid
4. Adrenal
5. Pancreas
6. Ovary (female)
7. Testis (male)

What is Endocrine Disruption?

In recent years, scientists have proposed that certain chemicals might be disrupting the endocrine system (glands, hormones, or receptors) of humans and wildlife. Disruption of this system may occur in various ways. For example, some chemicals may mimic a natural hormone. This "fools" the body into over-responding to the stimulus or responding at inappropriate times. Other chemicals may block the effects of hormones. Still others may directly stimulate or inhibit the endocrine system, causing overproduction or underproduction of hormones. Certain drugs are used to intentionally cause some of these effects, such as birth control pills.

What Chemicals Might Cause Endocrine Disruption?

Examples of classes of chemicals thought to act as endocrine disruptors are organochlorine pesticides (DDT, for example), polychlorinated biphenyls (also called PCBs), and chlorinated dibenzo-dioxins and –furans (also called dioxins). These classes of chemicals are also called persistent organic pollutants (POPs). Although their effects may be much weaker than those of the body's natural hormones, they are nonetheless suspected of disrupting the endocrine system. Harmful effects such as reproductive and developmental defects and certain cancers may result. U.S. Environmental Protection Agency (EPA) has banned PCBs and many organochlorine pesticides. Some organochlorine pesticides are still used in the United States; however, their use is very limited.

What Effects do Endocrine Disruptors Have on My Body?

A variety of chemicals are known to disrupt the endocrine systems of animals in laboratory studies. Compelling evidence has accumulated that endocrine systems of certain fish and wildlife have been affected by chemical contaminants. However, the

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relationship of human endocrine system diseases and exposure to environmental contaminants is poorly understood and scientifically controversial.

How Can POPs Enter My Body?

Persistent Organic Pollutants (POPs) enter the bodies of fish from water, sediment, and other particles in water, and from eating prey that have POPs in their bodies. POPs enter bodies of birds of prey that eat contaminated fish. People may be exposed to POPs by eating POP-contaminated fish or wildlife. Infants can be exposed when in the womb through the mother's contact with POPs or by drinking breast milk containing POPs. Other exposure sources could include touching or eating contaminated soil or inhaling air contaminated with POPs (for example, from a hazardous waste site).

How Do We Use This Information in Our Environmental Clean-Up Programs?

While we don't measure endocrine disruption by itself as an end point in animals or humans, we do account for potential effects in other ways. In ecological risk assessments we measure survival, growth, and reproduction of plant and animal populations. Endocrine disruption can affect any of these measurements. In human health risk assessment we evaluate the possibility of cancer and non-cancer effects. Agencies such as the EPA and the Agency for Toxic Substances and Disease Registry have developed health-based guidelines that specify safe exposure levels for pollutants taking into account endocrine disruption information.

Federal Government Recommendations

Because of the potentially serious consequences of human exposure to endocrine disrupting chemicals, Congress has mandated that the EPA develop endocrine disruptor screening programs to determine whether certain substances may have hormonal effects in humans. Information about the screening program can be found at the Internet URL listed below for the EPA. As new scientific information becomes available it will be incorporated into Air Force clean-up decisions.

For More Information

- **United States Environmental Protection Agency (U.S. EPA)**
  Internet URL: http://www.epa.gov/scipoly/oscpendo/index.htm
- **Agency for Toxic Substances and Disease Registry**
  Internet URL: http://www.atsdr.cdc.gov, Phone: 1-888-422-8737
- **United States Geological Survey (USGS)**
  Internet URL: http://water.usgs.gov/pubs/FS/FS-081-98
- **United States Fish and Wildlife Service (F&WS)**
  Internet URL: http://contaminants.fws.gov/Issues/EndocrineDisruptors.cfm
- **National Toxicology Program**
  Internet URL: http://ntp-server.niehs.nih.gov/htdocs/liason/LowDosePeerFinalRpt.pdf
- **Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis (AF IERA)**
  Internet URL: https://www.afms.mil/afiera, Phone: 1-888-232-ESOH (3764)