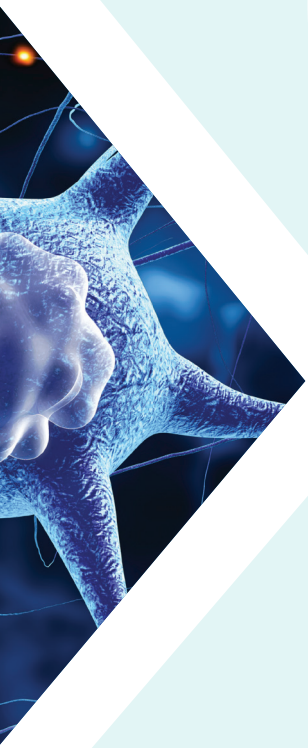
ENDOCRINE ACTIVE CHEMICALS

DISRUPT THE CONFUSION WITH FACTS

Answering Clinician Questions with Evidence-Based Science



ENDOCRINE POLICY FORUM

ENDOCRINE DISRUPTING CHEMICALS…DEFINED

If you are having difficulty separating the latest data from speculation when it comes to endocrine disrupting chemicals, you're not alone. Clinicians around the world are challenged with providing informed medical opinions for their patients based on a profusion of misinterpreted data and misguided claims. Here are some common questions directly from clinicians, and answers with evidence-based information.

Q Is there an official clinical definition of endocrine disrupting chemicals (EDCs)?

A Yes.

> *"An endocrine disruptor is an exogenous substance or mixture that alters function of the endocrine system and consequently causes adverse health effects in an intact organism, or its progeny, or (sub)populations."*

This is the globally-accepted definition established by the World Health Organization's International Programme on Chemical Safety. Both U.S. federal and European Union (E.U.) regulatory authorities use this definition in their efforts to screen, evaluate and test chemicals for endocrine activity and endocrine disruption potential.

The two-part definition requires that a chemical substance both:

- Alter the function of the endocrine system (endocrine activity); and
- Cause an adverse health affect in humans or wildlife, as a consequence of that alteration

Q Why make a distinction between endocrine activity and disruption?

A Endocrine active chemicals are the substances that "alter the function of the endocrine system." They do not necessarily cause adverse health effects in humans or wildlife, but over time the public has started referring to them as "endocrine disruptors." This is an inappropriate and often confusing misinterpretation and misuse of the WHO-IPCS definition.

The vast majority of the endocrine active substances that scientists have studied to date have not been demonstrated to cause adverse health effects at typical exposures as a consequence of endocrine activity, and so are not endocrine disruptors by the WHO-IPCS definition.

FAST FACTS: EDCs vs. EACs

- Endocrine disrupting chemicals (EDCs) cause adverse effects by an endocrine mode of action.
- Endocrine active chemicals (EACs) can modulate endocrine function, but may not have adverse effects.
- Any potential that an EAC might have for producing an adverse effect, whether by virtue of its endocrine activity or from another mode of action, can be avoided by maintaining safe levels of exposure.
- The U.S. Environmental Protection Agency (EPA) tests chemicals for their ability to alter endocrine function and cause adverse effects by that alteration.
- Safe levels of exposure can protect against adverse effects of EDCs, potential adverse effects of EACs, as well as other types of toxic effects.

LEVELS OF EXPOSURE

Q Can safe levels of exposure exist for endocrine active chemicals?

A Yes, endocrine pharmacology and medical toxicology establish that safe levels of exposure exist for endocrine active chemicals, both natural and man-made.

A safe level of exposure is the amount and frequency with which people can be exposed to a potentially hazardous substance without experiencing adverse health effects.

Some exposures to endocrine active chemicals will produce no response at all, while others may elicit transient (temporary) responses to which the body can naturally adjust and maintain its normal function.

Regardless of life-stage, there are levels and durations of exposure to endocrine active chemicals that are within the range determined to be safe.

It's important for patients to know that everyday products are designed to be safe when they are used as intended. To stay within acceptable ranges of exposure, consumers should read product labels closely and follow directions carefully. The primary focus should be on avoiding over-exposures so that potential health risks can be avoided.

While concerns about endocrine active chemicals are understandable, it is important to encourage patients to give greater attention to established health risks and the steps that they can take to lower the risk of disease. See the 'Managing the Patient Dialogue on Endocrine Disruptors' tip sheet for suggestions on how to do this.

Q Does it matter how potent the substances are?

A Yes, potency is critical.

The endocrine system distinguishes high-potency hormones that convey vital biological signals from other chemicals occurring naturally in the body that interact with it inconsequentially due to their low potency.

The endocrine system also responds to high potency chemicals which can alter its functional state through strong interactions that mimic or interfere with hormone action. It does not respond to low potency chemicals, which interact too weakly to alter its functional state.

LEVELS OF EXPOSURE

Q What about the dose of exposure to the chemicals? Can exposure to lower doses of chemicals actually be more harmful than higher doses?

A This question relates to what has been referred to as the "non-monotonic, low-dose hypothesis" – the idea that the slope of the dose-response curve for some chemicals changes direction at low doses.

Although this non-monotonic, low-dose hypothesis is often discussed in relation to endocrine-related science, scientists at regulatory agencies across the globe, including the EPA and European Food Safety Authority, have argued that the hypothesis could, in theory, apply to all chemicals, regardless of the mechanism by which they cause toxicity.

Some of those same regulatory agencies also have conducted rigorous reviews and have been unable to validate the non-monotonic, low-dose hypothesis using reproducible, relevant testing. This lack of validation is not surprising, since the hypothesis runs contrary to the well-established principle of dose-response relationships. In other words, "the dose makes the poison; dose differentiates a poison from a remedy." This principle is the cornerstone of drug development in modern pharmacology as well as safety assessment in modern toxicology.

Furthermore, EPA led a work group of scientific experts that reviewed various studies, and the conclusion of the group's draft report affirms what mainstream scientists have said for years: the purported scientific evidence for the non-monotonic, low-dose hypothesis, even as it might apply to endocrine active chemicals, is, at best, very weak.

Q Is there a link between exposure to EACs or suspected EDCs and adverse health effects (like cancer, reproductive diseases and disorders, neurobehavioral deficits and disorders, obesity, and diabetes)?

A Associations between the incidence of certain human diseases and exposure to chemicals suspected as endocrine disruptors have been raised in some reports and activist policy statements. However, many scientists have found the evidence to be weak, inconsistent, and often lacking coherence and biological plausibility. Frequently, the reported links are to chemicals that are already banned by regulatory agencies or have been voluntarily withdrawn from the marketplace by industry, which renders many of the health allegations counter-productive from a regulatory standpoint. Epidemiological information, including cohort studies and systematic reviews, suggests that a causal link between the exposure to chemicals and certain human diseases has not been proven, and that the alleged associations remain speculative. The adverse health outcomes are often the result of multiple factors.

Q Is it true that endocrine disrupting chemicals are completely unregulated?

A No. The notion that chemicals are "completely unregulated" is false. These claims can be traced to alarmist media reports and deliberate misinformation campaigns on the part of some activist groups.

Q What are government regulators doing to make sure people are protected?

A For decades, U.S. and E.U. regulatory authorities have had programs in place to

- Evaluate chemicals to determine if they are capable of causing adverse health effects,
- Characterize dose-response relationships, and
- Establish safe dose levels to guide human exposure limits.

Regulatory agencies have never required knowledge of the mechanism by which a chemical causes adverse effects, such as endocrine activity, to take necessary action to restrict or ban uses of that chemical to mitigate exposures and adverse health effects.

Recent scientific and policy developments in the U.S. like the Lautenberg Chemical Safety for the 21st Century Act and the Registration, Evaluation and Authorization of Chemicals (REACH) program in the E.U. have strengthened national regulatory programs. In the U.S., the Lautenberg Act gives EPA the authority to require product labels, restrict uses, or phase out chemicals that may pose an unacceptable risk.

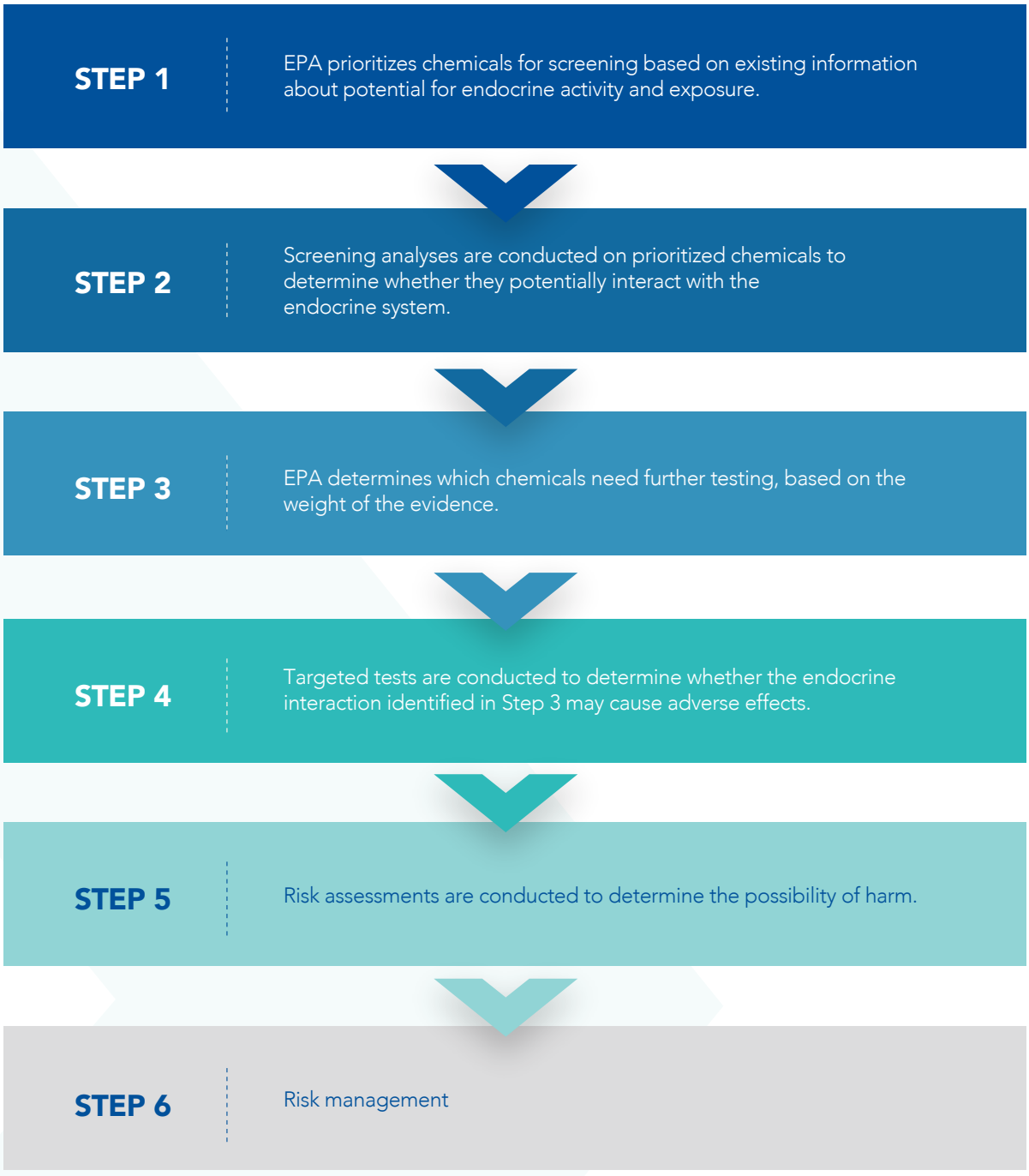
Q What does the U.S. government do specifically to screen chemicals for endocrine activity and test for health effects?

A The EPA uses a scientifically validated screening process to identify chemicals that interact with the endocrine system (endocrine active chemicals).

EPA requires validated scientific tests to be conducted to evaluate adverse health effects that occur when a chemical disrupts the endocrine system (endocrine disruptors) under real life conditions. EPA can regulate the use of those chemicals to prevent adverse health effects.

U.S. EPA Screening and Testing Program

In the late 1990s, the U.S. EPA created a step-by-step, science-based process to identify chemicals that interact with the endocrine system (endocrine-active chemicals), and chemicals that cause adverse health effects as a result of their interaction with the endocrine system (endocrine disruptors) in real life scenarios.



EPA's public health and environmental protection decisions are based on a firm foundation of scientific principles, a robust evaluation of data and information on endocrine activity.

LIST OF ENDOCRINE DISRUPTING CHEMICALS

Q **Is there one list of endocrine disruptors that I can refer to?**

A As of this writing, no authoritative list of EDCs exists.
Many lists which are in circulation actually **do not**:

- Use the globally accepted WHO/IPCS definition of an EDC
- Employ the best available science; or
- Consider factors like exposure or potency

Q **Do any lists have merit? Can I trust the lists that I see?**

A While some lists can serve important regulatory functions such as prioritizing chemicals for evaluation, others can be created by virtually anyone without a scientific basis – and even deliberately misused and mischaracterized as definitive science on EDCs, or as definitive classifications of EDCs.

The United Nations Environment Programme (UNEP) commissioned the International Panel on Chemical Pollution (IPCP) to research and identify every "list of EDCs" that had been published to date – including from governments, private groups, and others – and compiled them into a single database.

The findings of this research included:

- 24 self-identified "lists of EDCs"
- Many of the chemical lists were not created independently of one another- meaning some lists were based on other lists
- The lists failed to meet specific criteria that would indicate whether they were scientifically credible.

A detailed graphical explanation of how some of the most popular lists (e.g., SIN List, TEDX List) fail to meet those criteria is available at endocrinescience.org.

RESOURCES & REFERENCES

Further reading on the safe use of products containing chemicals:

ChemicalSafetyFacts.org
chemicalsafetyfacts.org

american cleaning institute®
for better living
cleaninginstitute.org

GMA
gmaonline.org

CropLife
croplife.org

CSPA
cspa.org

COSMETICS INFO
costmeticsinfo.org

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
epa.gov

United States CONSUMER PRODUCT SAFETY COMMISSION
cpsc.gov

FDA U.S. FOOD & DRUG ADMINISTRATION
fda.gov

Further reading on the approach and progress of chemical risk assessment programs:

ec.europa.eu/environment/chemicals/endocrine/strategy/euapproach_en.htm

epa.gov/assessing-and-managing-chemicals-under-tsca

epa.gov/endocrine-disruption

References

World Health Organization (WHO) definition from report IPCS (2002). Global assessment of the state-of-the-science of endocrine disruptors. Geneva, International Programme on Chemical Safety, World Health Organization and United Nations Environment Programme.

endocrinescience.org/lists-edcs-understanding-major-limitations-many-chemical- lists-tedx-list-sin-list-danish-epa-list-reach-svhc-list/

ec.europa.eu/environment/chemicals/endocrine/strategy/euapproach_en.htm epa.gov/assessing-and-managing-chemicals-under-tsca

epa.gov/endocrine-disruption

For other useful information, visit:

endocrinescience.org or
endocrinesciencematters.org

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