

Endocrine Disrupting Chemicals

Summary

Endocrine Disrupting Chemicals (EDCs) are chemicals that interfere with any aspect of hormone function. They are mostly synthetic, present in a wide variety of products and are widespread in the environment. They are commonly detected in tissues and body fluids of wildlife and humans. Increasing scientific evidence suggests that exposure to EDCs could be causing long-term damage to our environment and human health, including increasing our risk of breast cancer. Some EDCs can mimic the actions of natural oestrogen hormones. Exposure to elevated concentrations of natural and synthetic oestrogen is known to increase breast cancer risk. Long-term exposure to oestrogen mimics, such as bisphenol A found in plastics, may also increase risk.

Endocrine Disrupting Chemicals

What are endocrine disrupting chemicals (EDCs)?

An Endocrine Disrupting Chemical (EDC) or Endocrine Disruptor (ED) is any chemical that can interfere with normal hormone functions in humans and/or animals (1). The human endocrine system is a collection of glands which secrete different types of hormones, (including oestrogen) that regulate the body's growth and metabolism, sexual development, and behaviour. Naturally occurring hormones are usually active at very low doses. A healthy endocrine system is essential to the normal functioning of the human body.

Where are EDCs found?

Some EDCs are present in our natural environment including phytoestrogens (found in plants), however, most EDCs are synthetic compounds (2). Over a 1400 compounds are known or suspected to be EDCs (3). Only a small fraction of these has been investigated in tests capable of identifying endocrine effects in intact organisms.

EDCs are present in a wide variety of products including plastics, pesticides, cosmetics, fragrances, food, kitchen cleaners, adhesives, paints, clothing, medical equipment, and toys.

EDCs are widespread in the environment, in rivers, estuaries, soil, sewage treatment systems, drinking water and in polluted air (4). Mostly they originate from human activity such as wastewater effluent, agricultural runoff; leaching from landfill and industrial pollution.

EDCs are commonly detected in wild-life and human body fluids and tissues (5). EDCs enter the human body principally through ingestion of contaminated food and water, or through skin from personal care products and exposure to soil or dust particles.

Why should we be concerned?

There is now a large amount of scientific data that suggests that exposure to EDCs could be causing long term, and in some cases, irreversible damage to wildlife, our environment and human health. Many synthetic EDCs are persistent organic pollutants, such as polychlorinated biphenyls

(PCBs), and decompose very slowly. Their concentrations increase constantly up the food chain and will be highest amongst those at the top (including humans).

The detrimental effects of EDCs amongst wildlife are well documented. They include reproductive disorders including “testicular feminisation” in fish (6,7), cancers, adrenal and bone disorders (8), reduced biodiversity, population decline (9,10,11), greater susceptibility to infection (12,13), neurotoxicity and thyroid problems (14,15). The demonstrable effects of EDCs in wildlife could be indicative of long term effects in the human population. Whilst it is more difficult to demonstrate their effects, there is now strong scientific evidence that EDCs could be linked to a range of adverse health problems amongst humans. This is also the view of the UN environment agency, the World Health Organisation (16), the European Environment Agency (17) and many research scientists worldwide (18).

Some EDCs have been reported to cause adverse effects at very low dose levels. There is also concern that exposure to multiple EDCs can cause ‘combination effects’. Therefore, even when each individual chemical is present at a level below the threshold considered to cause harm, in combination with others they could form a hazardous cocktail in the human body (19, 20).

How are EDCs linked to breast cancer

High levels of natural oestrogens, which stimulate growth and differentiation of mammalian epithelial tissue, are an important factor in breast cancer risk (21). Synthetic oestrogens are known to be associated with increased breast cancer risk (22). Hormone replacement therapy used by postmenopausal women increases breast cancer risk significantly, as does the birth control pill (although to a much lesser degree).

Diethylstilbestrol (DES), a synthetic oestrogen used by pregnant women to prevent miscarriage, was the first synthetic EDC shown to affect human health. After several decades of use it was found that it enhanced breast cancer rates significantly in both exposed woman and their children (23). DES was withdrawn from use in the UK in 1974.

We remain exposed to many other EDCs which have been linked to breast cancer. For example, bisphenol A (24), phthalates (25,26,27,28,29), including monoethyl phthalate (30), parabens (31), a number of metals, known as “metalloestrogens”, (32), cadmium (33) and aluminium salts (34) have all been linked to adverse effects on the mammary gland.

There is also considerable evidence that exposure to EDCs during critical moments of development, for example in the womb, during early infancy, childhood or during puberty, could also increase the risk of developing breast cancers later in life (See full [Background Briefing](#) for references or our webpage on [In-utero exposures](#)).

Whilst it should be noted that not all scientists believe EDCs contribute to breast cancer incidence (35), the evidence that they play some part in increasing our vulnerability to the disease is starting to mount up.

The regulation of EDCs

Endocrine disrupting chemicals are regulated by the European Union. Under REACH (the EU's main chemicals regulation), substances with endocrine disrupting properties for which there is evidence of probable serious effects to human health or the environment, require authorisation and/or replacement. Recently, the EU chemicals agency classified BPA and 4 phthalates as substances of very high concern (SVHC) due to their endocrine disrupting properties (36). Inclusion on the SVHC list means that uses may be limited and subject to granting of a temporary, renewable authorisation. Most chemicals have not been tested for their endocrine disrupting properties and so few are subject to this procedure. In 2018 new criteria were adopted for identifying EDCs. These criteria require a high burden of proof to identify a substance as an EDC. Currently the criteria apply to EDCs used in pesticides and biocides only. The EU is now developing a new EDC strategy that will cover areas such as toys, cosmetics, and food packaging.

Breast Cancer UK is working with partners in Europe to press for an EDC strategy which promotes the phase out of potential and suspected EDCs and their replacement with safer alternatives. See our [EDC Policy](#) page for more information on our work in this area.

Breast Cancer UK position

- Breast Cancer UK is calling for the regulation of chemicals to be strengthened and improved, based on the precautionary principle, to pro-actively protect public health;
- Hazardous chemicals, including EDCs, to be recognised as preventable risk factors for breast cancer in all UK National Cancer Plans;
- The extension of EU Article 60 (3) of the REACH Regulation, to ensure EDCs are, by default, classed as Substances of Very High Concern (SVHC), for which no safe thresholds can be determined;
- An increase in the proportion of cancer research funding for prevention and the investigation of the environmental and chemical causes of breast cancer.

How can we reduce our exposure to EDCs?

- Diet Try to minimise intake of processed food; buy fresh, organic food if possible; minimise intake of preservatives; try to avoid heating food in plastic containers; use non-plastic water bottles.
- Cosmetics & household products Try to use fewer cosmetics, personal care products and cleaning products and less often. Choose products that do not contain EDCs such as triclosan, parabens, phthalates
- In the house Try to keep indoor dust levels down; improve air circulation by opening windows; when buying soft furnishings consider choosing natural materials e.g. cotton or wool.
- Outdoors Minimise use of pesticides; if possible avoid air pollution, such as air traffic pollution.

For more information see our [Reduce your Risk](#) webpages:

For a list of references cited please see [here](#).

Discover more

For more information on endocrine disrupting chemicals download our detailed scientific information download our full brief [here](#).

Page last updated October 20, 2018