

# Supporting document for the A to Z list of chemicals of concern: inclusion criteria and references

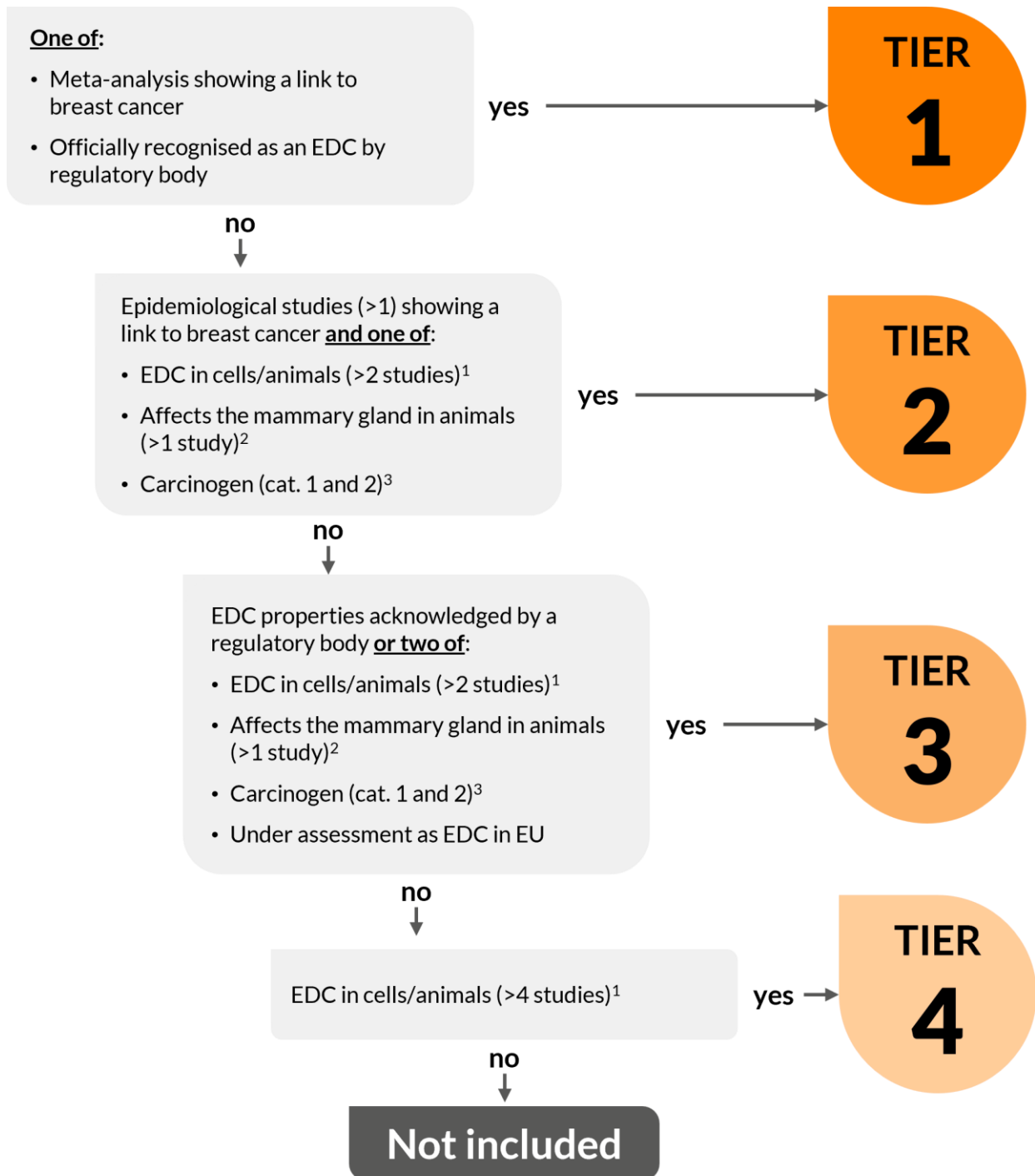
## Inclusion criteria and strength of evidence

This supporting document contains the inclusion criteria used for the **A to Z list of chemicals of concern**. Chemicals are classified into tiers based on the strength of available evidence according to the flow chart in Figure 1, with higher tiers indicating stronger evidence of a possible link to breast cancer. This ranking system is **NOT** a measure of the association between each chemical and breast cancer, and does **NOT** imply that tier 1 chemicals increase breast cancer risk, whilst tier 6 chemicals do not. For all chemicals on the list, the association with breast cancer is yet to be confirmed.

## How are the inclusion criteria applied?

Evidence is assessed for each chemical, or group of chemicals, to determine which tier they are placed in. For tier 1, there must be either one meta-analysis (an analysis of all the human studies available) showing a positive association with breast cancer, or formal recognition as an Endocrine Disrupting Chemical (EDC) by a regulatory body.

When meta-analyses or formal EDC recognition are not available, weaker evidence may be considered. For example, if there are epidemiological (human) studies showing links to breast cancer alongside data from animals or cells, this could justify inclusion in tier 2. If a regulatory body acknowledges some endocrine-disrupting properties, this could place a chemical in tier 3. If there are fewer than 5 studies showing evidence of EDC properties in either cells or animals, the chemical is not included in the list, as the evidence of a possible link to breast cancer is insufficient at this time. The tier classification is reported in Table 1, alongside the level of evidence that justifies the inclusion in the list.



**Figure 1.** Flow chart of the inclusion criteria used to create the A to Z list of chemicals of concern. The chemicals are classified in Tiers based on the strength of the evidence available. This is not, in any way, a measure of the association between a chemical and breast cancer. <sup>1</sup>Determined as interference with sex hormones (oestrogen and/or androgen) in cells or animals, or disrupting the growth of breast cells. <sup>2</sup>Causing mammary tumours or interfering with the development of the mammary gland in animals. <sup>3</sup>IARC classification or by governmental bodies.

**Table 1.** The chemicals are classified in Tiers and the evidence that justifies the inclusion in the A to Z list.

Chemical(s)	Evidence*
<b>TIER 1</b>	
4-Methylbenzylidene camphor	Officially recognised as EDC by EU
Acrylamide	Meta-analysis
Benzophenones	Officially recognised as EDC by EU (oxybenzone)
BHA	Officially recognised as EDC by EU (121-00-6 isomer) EDC properties acknowledged by EU (mixture)
Bisphenols	Officially recognised as EDCs by EU (BPA, BPS, BPB, TMBPA, TMBPF)
Flame retardants	Meta-analysis (brominated flame retardants) Officially recognised as EDC by EU (TPhP)
Hair dyes	Meta-analysis
Heavy metals	Meta-analysis (Cd, Ni, Pb)
Nonylphenols	Officially recognised as EDC by the EU
Parabens	Officially recognised as EDC by the EU (butylparaben, propylparaben, isobutylparaben)
Phthalates	Officially recognised as EDCs by EU (DEHP, DBP, BBP, DIBP, DCHIP)
Polychlorinated bisphenols	Meta-analysis
Polycyclic aromatic hydrocarbons	Meta-analysis
<b>TIER 2</b>	
Aluminium salts	Epidemiological studies EDC in cells/animals
Dioxins	Epidemiological studies Category 1 carcinogen
Malathion	Epidemiological studies Category 2A carcinogen
Pesticides	Epidemiological studies Category 2A and 2B carcinogens
PFAS	Epidemiological studies Category 1 and 2B carcinogens
<b>TIER 3</b>	
2,4-Dichlorophenoxyacetic acid	EDC in cells/animals Category 2B carcinogen
Benzyl salicylate	EDC properties acknowledged by EU
BHT	EDC in cells/animals Under assessment as EDC in EU
Ethylhexyl methoxycinnamate	EDC properties acknowledged by EU
Essential oils	EDC properties acknowledged by EU (tea tree oil)
Glyphosate	Mammary tumours in animals Category 2A carcinogen

Homosalate	EDC properties acknowledged by EU
Imazalil	EDC in cells/animals Likely carcinogenic
Octocrylene	EDC properties acknowledged by EU
Polycyclic synthetic musks	EDC in cells/animals Under assessment as EDC in EU
Triclocarban	EDC properties acknowledged by EU
Triclosan	EDC properties acknowledged by EU
<b>TIER 4</b>	
Cyclosiloxanes	EDC in cells/animals
Deltamethrin	EDC in cells/animals
Ethylhexyl dimethyl PABA	EDC in cells/animals
<b>Not applicable</b>	
Formaldehyde releasers	NA
Fragrance	N/A
Parfum	N/A

\*Other evidence may be available.

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