

Aluminium salts in antiperspirants

Why is aluminium used in antiperspirant?

Aluminium salts are the active ingredients used in antiperspirants. Salts commonly used include aluminium chloride, aluminium chlorohydrate, and aluminium zirconium chlorohydrate complexes (1). They may be listed in ingredients as “natural mineral salts”, “natural rock salts”, or “potassium alum” (potassium aluminium sulphate).

Aluminium compounds act by blocking sweat ducts under the arm. This prevents sweat from escaping onto the skin surface and reduces the moist environment in which odour causing bacteria multiply. Antiperspirants are a specific type of deodorant. Other types of deodorants may contain perfume to mask the smell and antimicrobial agents to inhibit bacterial growth - as it's the bacteria on the skin's surface that generates the smell from sweat (2).

Does aluminium enter skin cells?

Aluminium has been shown to be absorbed through intact skin from application of antiperspirant under the arm (3). When skin is damaged, for example during shaving, six-fold more aluminium can be absorbed (4).

The EU (5) has published a statement of caution that antiperspirant should not be applied to damaged or irritated skin, yet it is common to shave the underarm area before applying antiperspirant.

Antiperspirants are applied to the underarm and upper chest area and are left on the skin, allowing for continuous exposure to the aluminium salts. This is the region of the breast where the majority of breast cancers start. In the UK, for example, over 50% of breast cancers start in the upper outer quadrant of the breast near the underarm (6).

Aluminium has been measured in several human breast structures, including breast tissue (7, 8) and breast cysts (9), at higher levels than is present in blood.

What is the evidence aluminium salts are linked to breast cancer?

Whilst no studies have demonstrated a direct causal link between breast cancer and aluminium, recent opinion has questioned the ascribed safety of using aluminium salts in underarm cosmetics (10, 11, 12, 13).

Cell culture studies have shown that human breast epithelial cells can turn into a cancerous phenotype following exposure to aluminium chloride (14), and exposure of human breast cancer cells to aluminium chloride and aluminium chlorohydrate can make cells more motile (15, 16). Mortality from breast cancer is mainly associated with tumour spread, which depends on cancer cells developing motility.

Lifetime exposure to oestrogen is an established risk factor for breast cancer and aluminium chloride and aluminium chlorohydrate have been shown to act as metalloestrogens, capable of

interfering with oestrogen action and under certain conditions stimulating responses associated with natural oestrogen (17).

A recent in vitro study (18) found long term exposure to aluminium chloride at environmentally relevant concentrations (19) could cause mammary cells to become cancerous and capable of forming tumours (20).

A systematic review which aimed to estimate risk of deodorant/antiperspirant use for breast cancer concluded that although there was no evidence of risk, insufficient studies had been undertaken to obtain reliable results (21). A study published recently, which examined self-reported underarm cosmetic product use and breast cancer diagnosis, did find an association between long-term use of underarm cosmetics and an increase in breast cancer risk. Furthermore, underarm cosmetic use was associated with higher concentrations of aluminium chloride in breast tissue (22). More recent is needed to confirm both these associations.

The EU position on aluminium in antiperspirants

In 2014 the EU's Scientific Committee on Consumer Safety (SCCS) conducted an assessment of aluminium in antiperspirants and found there was no indication that these increase the risk of cancer, but acknowledged there were significant gaps in scientific data which impeded risk assessment (23). Risk assessments by other European agencies suggest aluminium in cosmetic products is not considered safe (e.g. 24). Currently, the SCCS is revising its assessment and the opinion will be published in October, 2017 (25).

Concerns about the possible link between aluminium salts-containing antiperspirants and breast cancer have led the Swiss National Council to consider a ban or else mandatory warning labels on all aluminium-containing antiperspirants (26).

Conclusion

Scientific evidence linking the use of underarm antiperspirants to breast cancer is inconclusive. However, as the above shows there is clearly some research that suggests the need for a precautionary approach to be taken. If you have concerns about aluminium salts in antiperspirants but still want to use a deodorant, look out for products that are "aluminium-free". Remember to ensure these products are "paraben-free" also.

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

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