

## Short Briefing | Aluminium salts as Antiperspirants

Antiperspirants use ingredients collectively known as 'Aluminium salts'. On an ingredients list these may be referred to as e.g. aluminium chloride, aluminium chlorohydrate, "rock salts" or "potassium alum" (potassium aluminium sulphate).

Aluminium salts 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 (1).

The use of aluminium salts in antiperspirants has caused debate amongst scientists - some epidemiological studies demonstrate their use may potentially increase breast cancer risk (2, 3) whilst others do not (4).

### Aluminium salts and breast cancer

The daily use of underarm antiperspirant has led to higher levels of aluminium in outer regions of the breast, compared with inner regions (5). This is also where many breast cancers start. However, this alone, is not enough to prove a link between aluminium salts and breast cancer. Whilst a direct causal link has not been proven, recent opinion has questioned the ascribed safety of using aluminium salts in underarm cosmetics (e.g. 6, 7).

Some *in vitro* studies have found that exposure to aluminium salts may cause cells to change in a way that may make them more susceptible to cancer (i.e. aluminium salts may not directly cause cancer, but may make the cell more vulnerable to a tumour developing). For example, one study found that human breast cells exposed to aluminium chloride when injected into mice resulted in tumour formation, whereas unexposed cells did not (8). Other studies have found aluminium chloride and aluminium chlorohydrate made breast cancer cells more motile (i.e. capable of moving around the body) (9, 10). This is of concern because mortality from breast cancer is mainly associated with tumour spread, which depends on cancer cells developing motility.

Another study found long term exposure to aluminium chloride at environmentally relevant concentrations (those encountered daily) could cause cultured animal mammary cells to become

cancerous (11). Aluminium has been measured in breast tissue (12) and breast cysts (13) at higher levels than is present in blood.

### Aluminium can act as an oestrogen mimic

Another reason for concern is because aluminium chloride and aluminium chlorohydrate can act as "metalloestrogens", capable of interfering with oestrogen action and under some conditions stimulate responses associated with oestrogen (14).

Natural oestrogen performs a function in the body that leads to rapid cell multiplication. Anything that accelerates the rate of cell division (and DNA copying) also increases the likelihood of mutations occurring. Over time, mutations accumulate, and their combined effects may lead to cancers. Anything that is able to mimic the action of oestrogen may therefore also increase risk of mutations and cancer.

A recent *in vitro* study (15) found aluminum chlorohydrate causes an increase in levels of a protein known as oestrogen receptor alpha, in oestrogen receptor positive breast cancer cells. This effect resulted in increased expression of genes that regulate breast cancer development & progression.

### What is the regulatory position?

The EU has published a statement of caution that antiperspirant should not be applied to damaged or irritated skin (16), yet it is common to shave the underarm area before applying antiperspirant. The German Regulatory Agency, BfR, advise women not to shave before applying antiperspirant as they may exceed the weekly tolerable intake of aluminium to the body (17). 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 breast cancer risk, but acknowledged gaps in scientific data which impeded risk assessment (18). Currently, the SCCS is revising its assessment and an opinion will be published in 2019 (19). Concerns about a possible link between aluminium salts-containing antiperspirants and breast cancer have led the Swiss National Council to consider a ban or mandatory warning labels on all aluminium-containing antiperspirants (20).

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### Should I stop using antiperspirants containing aluminium salts?

Scientific evidence linking the use of underarm antiperspirants to breast cancer is inconclusive. 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 more 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 increased breast cancer risk (22). As this brief shows, there is clearly some research that supports taking a precautionary approach. If you have concerns about aluminium salts in antiperspirants then choose products which are deodorants and are labelled “aluminium-free”.

### References

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### About Breast Cancer UK

#### Who are we?

Breast Cancer UK aims to prevent breast cancer through scientific research, collaboration, education and policy change. We educate and raise awareness of the risk factors for breast cancer and provide practical information to help people reduce these risks. We campaign to ensure government policies support the prevention of breast cancer. And we fund scientific research that helps to better understand what risk factors contribute to breast cancer, and how to address them

For further information on breast cancer risk factors please visit our website [www.breastcanceruk.org.uk](http://www.breastcanceruk.org.uk).  
To view this information in a more accessible format or to provide feedback, please contact us.

#### Disclaimer

This brief is for information purposes only and does not cover all breast cancer risks. Nor does it constitute medical advice and should not be used as an alternative to professional care. If you detect a lump or have any concerns, seek advice from your GP. Breast Cancer UK has made every effort to ensure the content of this leaflet is correct at the time of publishing but no warranty is given to that effect nor any liability accepted for any loss or damage arising from its use.

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