

Roses, noses, and underarms

how one variation in our DNA influences underarm perspiration (and ear wax)

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Sweating is useful. It helps to maintain body temperature, and hydrates and protects the skin. Sweating also helps regulate the body's levels of fluid and electrolytes such as sodium and calcium.

Skin contains two types of sweat gland—eccrine and apocrine. Eccrine glands are found all over the body, especially in the soles of feet and palms of hands. These glands discharge a salty perspiration on to the surface of the skin, which has a cooling effect as it evaporates.

Apocrine glands are found in the armpit and groin where they secrete an oily sweat into the canal of the hair follicle. These glands start secreting at puberty, and the sweat they produce may contain pheromones. But once this oily sweat reaches the surface of the skin, bacteria start to break it down, a process that can produce a noticeable odor and drives us to use deodorant.

But not everyone produces underarm (axillary) odor. Individuals who have a certain variant of the *ABCC11* gene produce less odorous sweat. They also happen to have dry earwax, as discussed in an earlier [Coffee Break](#).

Axillary odor and the type of earwax (wet or dry) are genetically determined by the variant rs17822931, which is a single nucleotide polymorphism (SNP) in the *ABCC11* gene. One of the functions of the transporter protein encoded by the *ABCC11* gene is to secrete amino acid conjugates of human odorants that lead to the production of axillary odor. The SNP is a 538G>A substitution and at least one functional G allele is needed for the transporter to be active. Therefore, individuals who have the GA or GG genotype are "genetically odorous", whereas the "genetically non-odorous" have the AA genotype.

In light of intriguing new research, the *ABCC11* gene is now being brandished as the "deodorant gene". A large study (n~6500) (1) has found that how often people used deodorant is strongly associated with which variant of the rs17822931 SNP they have. The non-odorous individuals (AA genotype) were five times *less* likely to use deodorant than the odorous (GG and GA genotypes).


The frequencies of the A and G alleles vary markedly across different ethnic groups. The A allele is very common in East Asians, and as expected, most people in this population don't need to use deodorant. And so they don't use it—it's estimated that only 7% of North East Asians regularly use deodorant. In contrast, the G allele is by far the more common allele in African and European populations.

In the UK, where the study took place, only 2% of the population (just over 1 million) is estimated to have the AA genotype. Interestingly though, the study found that only a quarter of the non-odorous individuals seemed to recognize that they don't produce odor and chose not to use deodorant. The remaining three quarters

regularly used deodorant, perhaps only because it is the social norm. The study goes on to predict that around ~\$14 million is wasted each year in the UK by non-odorous people buying deodorants, not to mention the needless exposure to chemicals and possible skin irritation that could be avoided.

So, are you one of the lucky individuals who can stop buying deodorant? A genetic test of your *ABCC11* gene would give you the answer, or much simpler, a quick check inside your ear to look for dry (gray and flakey) earwax. Or simpler still, just do the sniff test!

However, genotypes and earwax aside, the use of deodorant will most likely continue as it is now—an entirely personal choice.

 This tutorial highlights some of the NCBI resources that provide information about the "deodorant gene".

References

1. Rodriguez S, Steer C.D., Farrow A, Golding J, Day I.N. Dependence of Deodorant Usage on *ABCC11* Genotype: Scope for Personalized Genetics in Personal Hygiene. *J Invest Dermatol.* 2013. PubMed PMID: 23325016.