

**MESMERISING ORDER OF BODY ODOUR IN BIOCHEMICAL ROLE PLAYS SIGNIFICANTLY****<sup>1</sup>\*Pruthviraj K. Chaudhary, <sup>2</sup>Dr. Dhruvo Jyoti Sen, <sup>2</sup>Kushal Nandi and <sup>3</sup>Dr. Dhananjay Saha**<sup>1</sup>Shri Sarvajanic Pharmacy College, Gujarat Technological University, Arvind Baug, Mehsana-384001, Gujarat, India.<sup>2</sup>Department of Pharmaceutical Chemistry, School of Pharmacy, Techno India University, Salt Lake City, Sector-V, EM-4, Kolkata-700091, West Bengal, India.<sup>3</sup>Deputy Director, Directorate of Technical Education, Bikash Bhavan, Salt Lake City, Kolkata-700091, West Bengal, India.**\*Corresponding Author: Pruthviraj K. Chaudhary**

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**ABSTRACT**

Body odour is caused by a mix of bacteria and sweat on your skin. Your body odour can change due to hormones, the food you eat, infection, medications or underlying conditions like diabetes. Prescription-strength antiperspirants or medications may help.

**KEYWORDS:** Sweat gland, Eccrine gland, Apocrine gland, E-3M2H, HMHA, IVA, 3M3H, Bacteria.

**Overview:** Body odour is what you smell when your sweat comes in contact with the bacteria on your skin. Sweat itself doesn't smell, but when the bacteria on your skin mix with your sweat, it causes an odour. Body odour can smell sweet, sour, tangy or like onions. The amount you sweat doesn't necessarily impact your body odour. That's why a person can have an unpleasant body odour but not be sweaty. Conversely, a person can sweat excessively but not smell. This is because body odour is a result of the type of bacteria on your skin and how that bacteria interacts with sweat, not the sweat itself.<sup>[1,2]</sup>

**Possible Causes****5 Causes Of Body Odour**

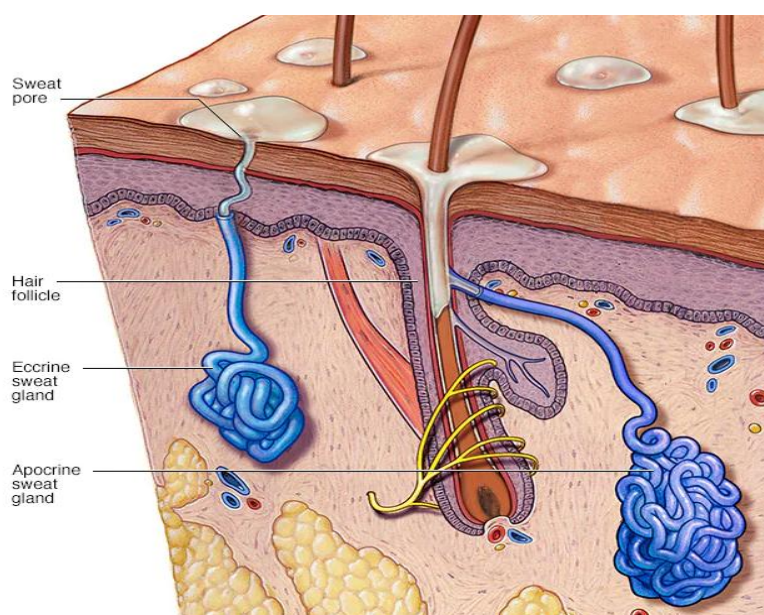
**Sugar:** If you are the type that takes too much of sugary things, it might cause body odour.

**Synthetic clothing:** Synthetic clothing keep sweat locked in because there is no way for them to go out.

**Spicy food.**

**Alcohol.**

**Not washing your undergarments.**

**Figure-1: Sweat glands.**

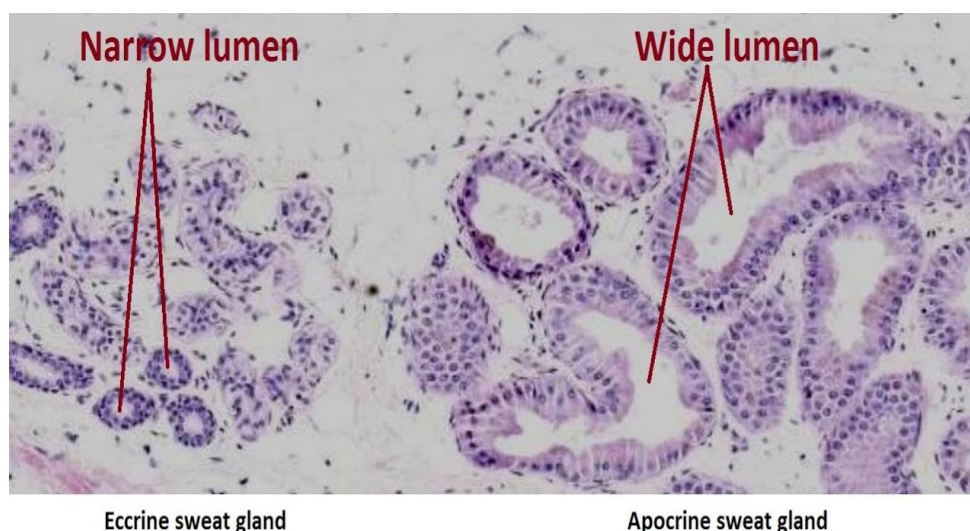
Sweating is the secretion of fluids by sweat glands onto your skin's surface. There are two types of sweat glands: eccrine and apocrine. Apocrine glands are responsible for producing body odour.

**Eccrine glands:** Eccrine glands secrete sweat directly to the surface of your skin. As the sweat evaporates, it helps cool your skin and regulate your body temperature. It doesn't produce a smell. When your body temperature rises due to physical exertion or being hot, the evaporation of sweat from your skin produces a cooling effect. Eccrine glands cover most of your body, including palms and soles.

**Apocrine glands:** Apocrine glands open up into your hair follicles. Hair follicles are the tube-like structure that keeps your hair in your skin. You can find apocrine glands in your groin and armpits. These glands produce sweat that can smell when it comes in contact with

bacteria on your skin. Apocrine glands don't start working until puberty, which is why you don't smell body odour in young children.

Sweating is a natural body process, but due to certain foods we eat, hygiene practices or genetics, sweat can have a bad smell once it comes into contact with your skin. Changes in the amount you sweat or the smell of your body odour could indicate a medical condition. Body odour is present in all animals and its intensity can be influenced by many factors (behavioural patterns, survival strategies). Body odour has a strong genetic basis, but can also be strongly influenced by various diseases and physiological conditions. Though body odour has played an important role (and continues to do so in many life forms) in early humankind, it is generally considered to be an unpleasant odour amongst many human cultures.<sup>[3,4]</sup>



Eccrine sweat gland

Apocrine sweat gland

Figure-2: Eccrine &amp; Apocrine glands.

In humans, the formation of body odours is caused by factors such as diet, sex, health, and medication, but the major contribution comes from bacterial activity on skin gland secretions. Humans have three types of sweat glands: eccrine sweat glands, apocrine sweat glands and sebaceous glands. Eccrine sweat glands are present from birth, while the latter two become activated during puberty. Among the different types of human skin glands, body odour is primarily the result of the apocrine

sweat glands, which secrete the majority of chemical compounds that the skin flora metabolize into odorant substances. This happens mostly in the axillary (armpit) region, although the gland can also be found in the areola, anogenital region, and around the navel. In humans, the armpit regions seem more important than the genital region for body odour, which may be related to human bipedalism. The genital and armpit regions also contain springy hairs which help diffuse body odours.

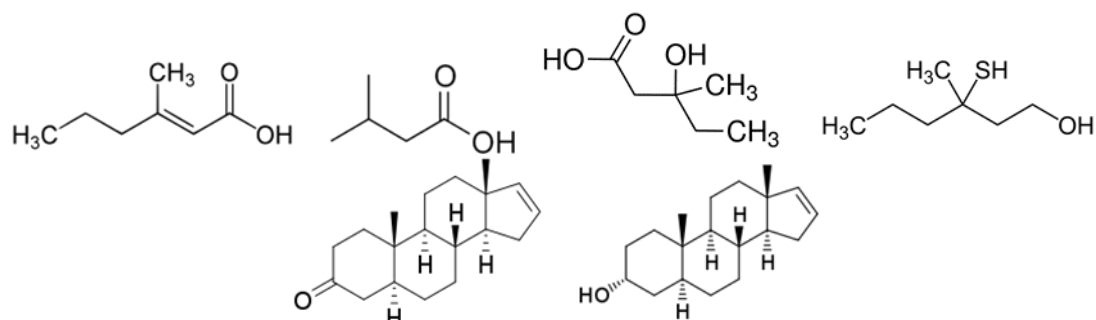


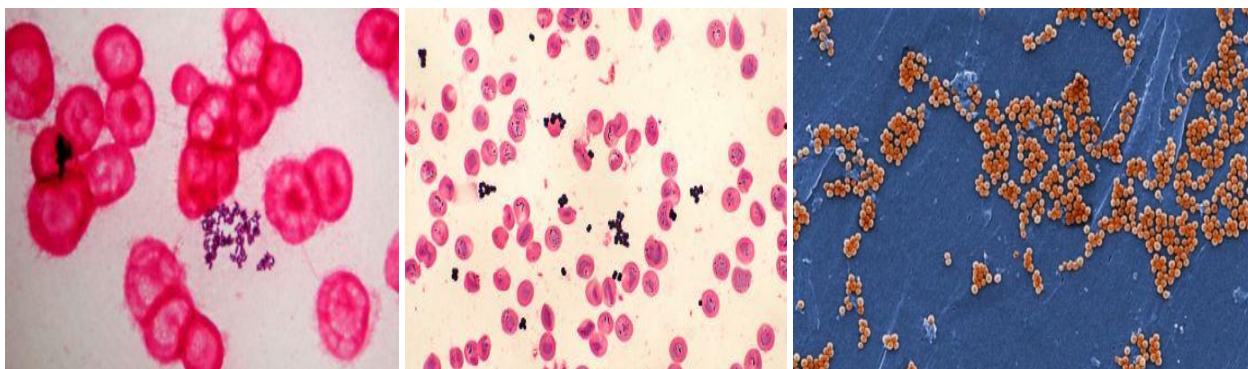
Figure-3: E-3M2H, IVA, HMHA, 3M3SH, Androstenone, Androstenol.

**Chemistry:** The main components of human axillary odour are unsaturated or hydroxylated branched fatty acids with E-3M2H (E-3-methylhex-2-enoic acid) and HMHA (3-hydroxy-3-methylhexanoic acid), sulfanylalkanols and particularly 3M3SH (3-methyl-3-sulfanylhexan-1-ol), and the odouriferous steroids androst-16-en-3-one (C<sub>19</sub>H<sub>28</sub>O, CAS: 18339-16-7, 5 $\alpha$ -androst-16-en-3-one) and androst-16-en-3 $\alpha$ -ol (C<sub>19</sub>H<sub>30</sub>O, CAS: 1153-51-1, 5 $\alpha$ -androst-16-en-3 $\alpha$ -ol). E-3M2H is bound and carried by two apocrine secretion odour-binding proteins, ASOB1 and ASOB2, to the skin surface. trans-3-Methyl-2-hexenoic acid (TMHA: C<sub>7</sub>H<sub>12</sub>O<sub>2</sub>: (2E)-3-Methylhex-2-enoic acid: CAS: 27960-21-0) is an unsaturated short-chain fatty acid that occurs in sweat secreted by the axillary (underarm) apocrine glands of Caucasians and some Asians. Hexanoic acids such as TMHA have a hircine [goat] odour. Isovaleric acid (IVA: 3-methylbutanoic acid: CAS: 503-74-2) is the other source of body odour as a result of actions of the bacteria *Staphylococcus epidermidis*, which is also present in several types of strong cheese. 3-Methylbutanoic acid, also known as  $\beta$ -methylbutyric acid or more commonly isovaleric acid, is a branched-chain alkyl carboxylic acid with the chemical formula (CH<sub>3</sub>)<sub>2</sub>CHCH<sub>2</sub>COOH. It is classified as a short-chain fatty acid. Like other low-molecular-weight carboxylic acids, it has an unpleasant odor. The compound occurs naturally and can be found in many foods, such as cheese, soy milk, and apple juice. Factors such as food, drink, and diseases can affect body

odour, as can lifestyle and genetics. Of the fatty acids contributing to Caucasian men's underarm odour, TMHA has the most prominent odour.

**Serology:** Body odour is influenced by the actions of the skin flora, including members of *Corynebacterium*, which manufacture enzymes called lipases that break down the lipids in sweat to create smaller molecules like butyric acid. Greater bacteria populations of *Corynebacterium jeikeium* are found more in the armpits of men, whereas greater population numbers of *Staphylococcus haemolyticus* are found in the armpits of women.

This causes male armpits to give off a rancid/cheese-like smell, whereas female armpits give off a more fruity/onion-like smell. *Staphylococcus hominis* is also known for producing thioalcohol compounds that contribute to odours. These smaller molecules smell, and give body odour its characteristic aroma. Propionic acid (propanoic acid) is present in many sweat samples. This acid is a breakdown product of some amino acids by propionibacteria, which thrive in the ducts of adolescent and adult sebaceous glands. Because propionic acid is chemically similar to acetic acid, with similar characteristics including odour, body odours may be identified as having a vinegar-like smell by certain people.<sup>[5,6]</sup>



**Figure-4:** *Corynebacterium jeikeium*, *Staphylococcus haemolyticus* and *Staphylococcus hominis*.

**Personal hygiene and lifestyle:** Keep your skin clean by taking a daily bath or shower with antibacterial soap. Focus on the areas where you sweat the most, like your armpits and groin area. Removing some of the bacteria on your skin regularly can prevent unpleasant body odour. Keep your armpits shaved, so sweat evaporates quickly and doesn't have as much time to interact with bacteria. Hair is a breeding ground for bacteria. Regularly wash clothing, and wear clean clothes. Wear loose-fitting clothing made of cotton. This allows your skin to breathe. This rule also applies to underwear and bras. Moisture-wicking (fabric that can pull moisture away from your skin) clothing is also helpful.

Use a topical antiperspirant, which works by pulling sweat back into your sweat glands. Sweat production decreases when your body receives a signal that your sweat glands are full. These include over-the-counter, as well as prescription, antiperspirants. Try removing overly smelly foods from your diet or pay attention to if specific foods make your body odour worse. Garlic, onions and alcohol are a few examples of food that may make your sweat smell more unpleasant.

Find ways to reduce your stress levels. Stress can cause your apocrine glands to activate.





**Figure-5: Odour and deodorant.**

Everyone has a unique body odour (BO), which can be pleasant or subtle, but when we think of BO, we usually think of an unpleasant smell. Changes to body odour may be due to puberty, excessive sweating, or poor hygiene. Sudden changes are typically caused by the environment, medications, or foods that you eat.<sup>[7,8]</sup>

**Body Odour Prevention:** Take a bath or shower every day. Wash your clothes regularly and make sure to wear clean ones. Try to avoid strong-smelling foods that may seep through your pores. Put on an antiperspirant at bedtime. Many antiperspirant preparations also contain a deodorant, which helps to mask the smell. A deodorant is a substance applied to the body to prevent or mask body odor due to bacterial breakdown of perspiration in the armpits, groin, and in the foot, and in some cases vaginal secretions. A subclass of deodorants, called antiperspirants, prevents sweating itself, typically by blocking sweat glands. Antiperspirants are used on a wider range of body parts, at any place where sweat would be inconvenient or unsafe, since unwanted sweating can interfere with comfort, vision, and grip (due to slipping). Other types of deodorant allow sweating but prevent bacterial action on sweat, since human sweat only has a noticeable smell when it is decomposed by bacteria. Food and Drug Administration classifies and regulates most deodorants as cosmetics but classifies antiperspirants as over-the-counter drugs. Use of deodorant with aluminium compounds has been suspected of being linked to breast cancer, but research has not proven any such link.<sup>[9,10]</sup>

## CONCLUSION

Sweating and body odour are caused by sweat glands in your body. The two main types of sweat glands are eccrine glands and apocrine glands. Eccrine glands occur over most of your body and open directly onto the surface of the skin. When your body temperature rises, these glands release fluids that cool your body as they evaporate. Apocrine glands are found in areas where you have hair, such as your armpits and groin. These glands release a milky fluid when you're stressed. This fluid is odourless until it combines with bacteria on your skin. Sweating and body odour are common when you exercise or you're too warm. They're also common when you're feeling nervous, anxious or stressed. Unusual changes in sweating — either too much (hyperhidrosis) or too little (anhidrosis) — can be cause for concern. Changes in body odour also may signal a health problem. Otherwise, lifestyle and home treatments can usually help with normal sweating and body odour.

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