

# HOW CAN WE UNDERSTAND WHETHER HALITOSIS COMES FROM MOUTH OR BREATH ?



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Halitosis may be physiologic, oral, paranasal, gastroesophageal, breath and psychologic. Oral and Breath malodors are etiologically and clinically different, but sometimes misdiagnosed. This paper focuses on the origin of Oral and Breath malodors and the differences of their clinic signs.

**Oral (malodor) Halitosis** (oral malodor, oral halitosis, tongue odor) is generated from bacterial putrefaction of proteins and glycoproteins by resident microflora. The most important site within the oral cavity is considered to be the dorso–posterior portion of the tongue, where microbial biofilms are present. (Hartley et al 1996), (Hess et al 2008), (Aydin M, 2004).

About 700 different compounds were detected in the human mouth, and there are three major gases of oral malodor:

- 1- **Volatile sulfur compounds** (VSCs), the first three main compounds consist of hydrogen sulphide ( $H_2S$ ), methyl mercaptan ( $CH_3SH$ ), and dimethyl sulfide ( $(CH_3)_2S$ ).
- 2- **Volatile organic compounds** (VOCs), the 30 most abundant VOCs in the mouth air are alkanes or alkane derivatives, with the first three being methyl benzene, tetramethyl butane, and ethanol. Alkanes are aromatic products resulting from oxidative stress of inflamed gingival cells (Phillips M, Cataneo RN, 2005). Short chain acids such as butyric, valeric, isovaleric, lactic, caproic, propionic, succinic acids are also VOCs.
- 3- **Nitrogen containing gases** (amines), ammonia, methenamine, indole, skatole, putrescin, cadaverine, trimethylamine and others. (Dadamio J, 2011)  
Even though some specific bacteria, especially Gram negative anaerobes, were proposed responsible from halitosis (Kozeowski Z, 2007), (Salako NO, 2011), not only specific anaerobes, but also most of oral flora members can easily degrade proteins into peptides and amino acids, eventually resulting in Oral malodor halitosis. Each bacterium may lead to production of a different foul odor. There is no need to label any specific bacterium as odorogenic. Every bacterium is (in low or high degree) odorogenic. (Aydin M, 2008)

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**Breath (malodor) Halitosis** comes from blood gases. Naturally volatile aromatic metabolites, usually by-products of biochemical processes, are present in the breath (Tangerman A, 2002). Exhaled molecules reflect the arterial concentrations of biological substances (Whittle *et al.*, 2007). A total of 3,481 different VOC were observed in the breath of normal humans (Phillips *et al.*, 1999). Many alcohols and aldehydes exhaled that have pungent odor begin to be offensive when they exceed a specific threshold.

In the breath of healthy persons, ammonia, acetone, methanol, ethanol, isoprene, propanol, acetaldehyde, C13-20 alkanes, and hydrogen were measured as 833, 477, 461, 112, 106, 18, 22 ppb,  $1.5 \times 10^{-10}$  M /l, <10 ppm respectively. (Smith D, 2007) (Phillips M, 2000) (Hamilton LH, 1998).

Most of them are end product of lipid, nitrogen, cholesterol, alcohol, carbohydrate, protein or aminoacid metabolism, oxidation of proteins, pancreatic insufficiency, carbohydrate malabsorption intolerance, abnormal gut flora, bacterial gut overload, liver or renal failure, or subclinic trimethylaminuria disease.

A list of exhaled volatiles in patients with systemic disease, such as diabetes mellitus, sleep apnea, H. pylori infection, sickle cell disease, asthma, breast cancer, lung carcinoma, chronic obstructive pulmonary disease, cystic fibrosis, liver disease, cirrhosis, uremia, kidney failures, trimethylaminuria, has been published (Whittle CL, 2007).

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**Distinction between Oral and Breath Halitosis** : Both give similar sign of bad odor in the mouth and/or breath.

Where is odorous gas emitted from ?

The mouth or from the breath?

The difference is important for both, diagnosis or treatment. In order to distinguish between them, some useful tools are listed below:

- If a piece of ice is kept for 1 minute in the mouth (in particular on the tongue dorsum), odor decreases if Oral malodor halitosis exists. This is because mouth gases are condensed by cold, become less volatile.
- If 6mM ZnCl<sub>2</sub> (zinc chloride) solution is kept in the mouth for 1 minute, on the tongue dorsum in particular, odor sharply disappears if Oral malodor halitosis exists. This is because Zn (zinc) binds with many odorous gases in the mouth especially sulfurous gases (Kleinberg I, 2002). In this experiment Zn containing commercial mouthwashes are not acceptable because sweeteners, alcohol or aromatic additives usually present in commercial rinses mask the odor or lead to a different bad odor.
- Physical effort decreases Oral malodor halitosis, but not breath malodor halitosis.
- If odor continues while mouth is closed, it is probably breath malodor (or nasal malodor) halitosis.
- Eye burning without any known reason may be a sign of breath malodor halitosis. This is due to exhaled gas reaching the conjunctiva and irritates it.
- If body odor is accompanied by halitosis, it is probably breath malodor halitosis. This is because blood gases are emitted from not only the breath, but also sweat on the skin.
- If more than one kind of bad odor is present, it is probably breath malodor halitosis.
- Saliva smells bad when dried. To lick and sniff the wrist gives a false positive every time. This is because indol and other soluble gases (Codipilly D,2008) in saliva are spontaneously released when the liquid part of saliva vaporized from the surface (Aydin M, 2008).

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