



## Arbeitsgemeinschaft Olfaktologie und Gustologie

der Deutschen Gesellschaft für Hals-Nasen-Ohren-Heilkunde, Kopf und Hals-Chirurgie

### Patient Information: Smell and Taste Disorders

In Germany, approximately 50000 patients per year experience problems with their taste and smell. If you have experienced similar problems, you are not alone.

#### What happens during smelling and tasting?

Smell and taste belong to the group of senses that detect chemical substances, i.e. they belong to the “chemical senses”, or, in medical terms, are chemo-sensory. Smell and taste begin with molecules, which are released by most things surrounding us. These molecules activate sensory cells or specialised nerve cells in the nose and mouth. Then, sensory cells transmit signals to the brain, where smell and taste are perceived and recognised.



Smell cells (olfactory sensory cells) are activated by odours, for example fresh bread, roses or sweat. The smell cells are located in a small area deep inside the nose, at the roof of the nose, between the eyeballs, where they are fairly well protected. From there, the signals are transmitted via the smell nerve (olfactory nerve) directly to the brain.



Taste cells (gustatory sensory cells) are activated by molecules in food and drinks. The signals from the taste cells are transmitted to the brain by more than one nerve (cranial nerves: facial nerve, glossopharyngeal nerve and vagus nerve). Taste cells are predominantly located in the taste buds in the mouth and throat. Many of the tiny round bumps (papillae) you can see on your tongue contain taste buds. Basically, every human can detect five primary taste qualities: sweet, sour, salty, bitter and “umami”. Umami is the taste of glutamate, which is most commonly likened to the taste of meat stock. Many foods, especially meat, tomatoes and parmesan cheese contain glutamate.

Furthermore, the so-called “sense of touch nerve” (trigeminal nerve) is involved in sensations of smell and taste in mouth and throat. Sensations transmitted through this nerve are, for example, burning and stinging in one’s nose caused by cigarette smoke, the acidity of vinegar or the cooling effect of menthol. Trigeminal signals in the mouth are caused by hot or cold food, hot pepper and textures of food and drink.



What happens during eating?

When you eat, the flavor (refined taste) is composed from different constituents: the five basic taste qualities, texture (crispy, creamy, etc.), temperature, spicyness and the sense of smell. This astonishing variety of sensations finally results in the typical “taste” of certain foods, for example, a peach. The sense of smell plays a significant part in this. You can try this for yourself: If you pinch your nose shut while eating a piece of fruit, for example, an apple, you will barely notice its specific aroma – you will mostly taste sweet and sour and feel its texture. For the sensing of aroma, air flow via the nose to the nasal smell cells is required. The “typical taste”, or refined taste of food and beverages is therefore largely mediated by the sense of smell<sup>1</sup>!

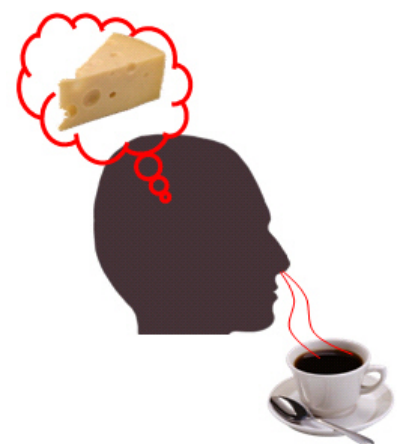
Disorders such as limited aroma perception can occur as an additional symptom in loss of smell, while disturbances of the sense of taste proper refer to disturbances of basic taste qualities.

Which smell and taste disorders exist?

The most common disorder is complete or partial loss of smell or taste.

Complete inability to perceive odours is called anosmia (loss of the sense of smell). Complete loss of the sense of taste is called ageusia. Reduced sense of smell is called hyposmia, and reduced ability to taste is hypogeusia.

Other disorders include altered perception of odours or flavours (parosmia and parageusia): odours or flavours are “wrongly” interpreted. These “wrong” perceptions can be quite unpleasant, and previously pleasant smells or flavours are often perceived as unpleasant.



On the whole, smell disorders are much more common than taste disorders. A smell disorder sometimes also leads to a decreased sense of taste. An existing taste disturbance can sometimes become apparent following one's loss of the sense of smell.

#### What causes smell disorders?

Congenital absence of the sense of smell is observed in one among 8000 newborns, more frequently in females than in males. In rare cases, congenital smell disorders can occur together with other conditions. Therefore, a child with an absent sense of smell should be presented to a physician, on order not to fail to recognize a rare condition, such as the Kallmann Syndrome.

Most smell disorders have a specific cause, such as viral infection of the upper respiratory tract, or head injuries (for example following a fall, or a blow to the head). Other common causes are nasal polyps, chronic sinusitis or hormone imbalances. A change in sense of smell can also be caused by chemicals, medications, or radiotherapy to the head and neck.

With advancing age, smell disorders become more common; in rare cases, a smell disorder may also be an early symptom of a neurological illness, e.g. Parkinson's Disease.

#### What causes taste disorders?

The sense of taste is transmitted by more than one nerve, therefore a complete loss of the sense of taste is rare. Disturbance of taste in certain areas of the tongue can occur after operations in the throat (e.g. tonsillectomy) or ears (e.g. middle ear surgery). Sometimes the sense of taste will recover on its own in cases like these. Taste disorders can also be caused by certain medications and almost always occur during and after radiotherapy to the head and neck. After change of medication and/or completion of radiotherapy the taste may recover spontaneously.

It is important to distinguish a separate taste disorder from a smell disorder, as in smell disorders the sensation of subtle aromas is no longer possible (see above).

## How to diagnose Smell and Taste disorders?

To diagnose the severity of a smell or taste disorder, odour or taste samples are repeatedly presented to the nose or tongue, respectively. This allows the practitioner to determine the concentration of odour required to be perceived (threshold), or the number of samples correctly identified (identification).



A method to objectively diagnose smell and taste disorders is the measurement of brain stem waves caused by smell or taste sensations in an electroencephalogram (EEG).



Magnetic resonance Imaging (MRI) of the head may reveal central nervous abnormalities responsible for disturbances of taste and smell.

There are some centres, specialised in extensive diagnostic work-up of smell and taste disorders, and your ENT specialist may be able to offer advice.

## How serious are smell and taste disorders?

If chemical senses are impaired or even absent, the body loses an essential alarm system whose importance often gets recognised only once it stops working. The sense of smell will alert you to fire, poisonous fumes or food that has gone off. Loss of smell and taste sensations may lead to depression. Sometimes smell and taste disturbances may be a symptom of other systemic illnesses, such as malnutrition, hypothyroidism, renal failure, tumours, Parkinson's Disease and Alzheimer's Dementia. Smell and taste disorders diminish quality of life.

## Can smell and taste disorders be treated?

Treatment of the basic illness which caused smell and/or taste disturbances can partially or entirely restore the the impaired chemical senses e.g. smell disorders due to inflammatory conditions of the nose and paranasal sinuses, may be successfully treated with anti-inflammatory drugs - but may, in certain cases, also require surgery.

Patients suffering from smell and taste disorders caused by certain medicines, may may benefit from a change of



medication.

Unfortunately, in long standing smell and taste disorders following viral infections or head injury, there are very few therapeutic options.

At present, new ways of treating smell and taste disorders are tested in various centres, for example “smell training” which takes advantage of the ability of smell receptor cells to regenerate.

### How can you get help if you suffer from a smell or taste disorder?

The exact diagnosis of the condition is the key! It is usually made by a Neurologist or an Ear Nose and Throat (ENT) specialist. Diagnostic work-up can also reveal an underlying condition whose treatment can positively influence the taste or smell disorder.

Even if your sense of smell or taste cannot be restored, it is useful to talk to an experienced practitioner in order to assess the severity and impact of the condition and in order to help with practical advice.

If possible, you should bring old CT or MRI images, medical records or clinic letters as well as a list of your medications. The doctor will then be able to make a thorough assessment of your past medical history and your state of health.

### What are important research topics in smell and taste disorders?

In Germany (and Europe), clinical smell and taste research is primarily conducted in ENT and Neurology centres. In Germany, the Olfaction Working Group of the German Society for Oto-Rhino-Laryngology collaborates with some of these centres on joint research projects.

Significant progress has been made in setting standards for the measurement of smell and taste disorders. Tests with detailed normative values have been developed, as well as, methods to provide objective evidence of smell and taste disorders which are used as a diagnostic standard in several centres in Germany. Specific history given by the patients using standardised questionnaires plays an important part in expanding knowledge about distribution, causes and particular details of smell and taste disorders.



## **Practical advice for patients with smell disorders**

### **Nutrition**

#### Storage of food items

- Optimised storage of food items (cool, dry)
- Pay attention to “Best Before” dates
- Labelling of neutral packaging
- Store separately from potentially hazardous substances



#### Utilization of food items

- Check the date of purchase and “best before” date
- Quality check by visual inspection or with the help of someone with functioning sense of smell
- If in doubt, throw away
- Ask someone with a good sense of smell to check the smell of foods

### **Cooking**

- For seasoning, strictly follow recipes and use scales, if necessary
- Use all senses (consistency, temperature, spicing)
- During cooking, keep an eye on the stove to avoid food burning, or use an alarm or a timer



### **Eating**

- Careful: When the sense of smell is impaired, the sense of taste will also be reduced, which can lead to excessive use of sugar or salt
- Stimulate the sense of touch in the mouth and pharynx (consistency, temperature, spicing)
- First savour with your eyes (colour, garnishing)
- Take your time when eating

### **Personal Hygiene**

- Body care and changing clothes
  - by timetable
  - always after physical exertion and sweating
- ask partner or friend to choose cosmetics and perfume
- ask partner or friend for advice on how much perfume to use
- schedule for
  - bathroom cleaning
  - airing
  - laundry





- waste disposal
- strict pet hygiene

## Household

- Careful with open flames (candles, gas stove, fireplaces)
- Label hazardous and flammable substances, do not decant them, keep them separately from other household items
- Install smoke detectors and gas detectors

## Occupation and Hobbies

- Careful when handling hazardous substances (i.e. in chemical industry), especially when exposed to gaseous substances (plumbing, heating etc.) or smoke, which may be detected too late or not at all if the sense of smell is impaired
- Notify the occupational health department if working with potentially hazardous substances and ask to have duties amended
- Label hazardous/poisonous/flammable substances
- Use smoke detectors, air filters
- "Borrow" a healthy colleagues/partner's nose



## Practical advice for patients with taste disorders

- "Olfactory" spicing and flavouring (use aromatic spices)
- Stimulate sense of touch in mouth and pharynx (consistency, temperature, spicing)
- Stimulate residual sense of taste for sweet, salty, bitter and "umami"
- First savour with your eyes (colour, garnishing)
- Take your time when eating

(Taste disorders such as limited sensation of aroma can, as mentioned before, occur in smell disorders, whereas taste disorders, strictly speaking, affect the basic taste sensations.)



## Working Group of Olfactology and Gustology:

Chairman: Prof. Dr. med. K.-B. Hüttenbrink, Univ. HNO-Klinik, Kerpener Straße 62, D-50924 Köln  
 Deputy Chairmen: Prof. Dr. T. Hummel, Univ.-HNO Klinik, Fetscherstrasse 74, D-01307 Dresden  
 Prof. Dr. A. Welge-Lüssen, Univ.-HNO Klinik, Petersgraben 4, CH 4031 Basel  
 Prof. Dr. Ch. Müller, AKH, Währinger Gürtel 18-20, A 1090 Wien

This information leaflet was written by:

Prof. Dr. med. Thomas Hummel, HNO Klinik der Universität Dresden, Tel. 0351-458-4189, Fax 0351-458-4326, [thummel@mail.zih.tu-dresden.de](mailto:thummel@mail.zih.tu-dresden.de) and

PD Dr. med. Boris Haxel, HNO Klinik Universitätsmedizin Mainz,

Prof. Dr. med. Boris Stuck, Universitäts-HNO Klinik Mannheim,

Prof. Dr. med. Karl-Bernd Hüttenbrink

and Prof. Dr. med. Hilmar Gudziol, Univ. HNO Klinik Jena.

Photographs by Franz Grosse, Univ. HNO Klinik Dresden

For more information (German language only)

<http://www.hno.org/olfaktologie>

Translation: Anja Lieder, MD, Specialist ENT Registrar, Sunderland Royal Hospital, UK, and Cornelia Hummel, MD, TU Dresden