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EDITORIAL

About smell and taste from medical to social

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The normal functioning of the olfactory and gustatory analysers plays an important role in nutrition, food selection and human interactions; that is why it is important for maintaining a good quality of life.

In modern times, we hear more and more often using the term "gastronomy" or "culinary art", and smell and taste are their fundamental conditions. Taste stimulates appetite and smell is the receptor for aromas. The olfactory-gustatory sensation can create by memorization, for each of us, a cascade of pleasant memories. In our psycho-olfactory memory we can fix sensory memories of some foods and drinks, but also the specific smell of some people and last but not least rituals (aromatherapy), cultural or sexual aspects.

Therefore, it is easy to understand that the loss of smell can have serious consequences on the quality of life and health by not being able to identify spoiled foods before consuming them, and it may even lead to psychiatric disorders such as depression.

The term *normosmia* is used to define a normal olfactory function. Smell disorders have been divided into two categories: qualitative and quantitative. The qualitative ones refer to the change of the smell quality, while the quantitative category refers to the change in the intensity of olfactory acuity[1]. Thus, the category of *quantitative dysfunctions* includes anosmia (complete absence of smell) and hyposmia (decreased olfactory acuity). *Qualitative smell disorders* include: hyperosmia (increased perception of smell), which is a rare condition but has been described, for example, in association with migraine; parosmia - misperception of an existing smell that can occur in neurological or psychiatric diseases; phantosmia - the perception of a smell in its absence, the prerogative of psychiatric pathology.

Very often, qualitative disorders are found in combination with quantitative ones, being unlikely to exist independently. Many patients with smell disorders also complain of loss of taste. Only about 10% of patients complain of an isolated loss of taste. However, there is a measurable loss of taste in less than 5% of these patients.

There are many *causes* for the occurrence of smell disorders. The most common are chronic rhinosinusitis with or without nasal polyps, viral respiratory infections and craniocerebral trauma. These three etiologies have been identified in the literature in approximately two-thirds of the patients evaluated. However, there are also neurological causes (Parkinson's disease, Alzheimer's disease, multiple sclerosis) or medical treatment causes (chemotherapy, antihypertensives, antibiotics, antiarrhythmics, antidepressants, anticonvulsants, etc). Drugs suspected of causing smell deficiencies have been noted in a document entitled "Physician Desk Reference", but without reference or recognized only in isolated reports. Calcium channel blockers and statins can be incriminated, although these drugs usually affect the taste more than the smell[2].

The literature does not highlight the relationship between the occurrence of smell disorders and the duration of administration of the drug in question or the reversibility of acuity upon cessation of its administration. However, three months per year may be a reasonable time to develop an olfactory disorder due to prescribed medications. It may take three to nine months or more to improve or return to

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normal once the medicine is stopped.

Last but not least, some toxic substances (alcohol, cocaine, ammonia, hairdressing chemicals, gasoline, formaldehyde, welding agents, benzene, sulfuric acid, cadmium, acrylates, iron, lead) can cause impaired sense of smell.

We could also cite certain chronic diseases (renal or hepatic impairment, complicated type 2 diabetes, ENT cancers, HIV / AIDS infection), strokes, brain or nasal and sinus tumors. Sometimes, smell disorders may occur postoperatively after nasal surgery, after total laryngectomy (circumstance in which the patient breathes through the tracheal cannula and not through the nose), but also due to nutritional deficiencies (malnutrition; vitamin B12, B6, A, zinc or copper deficiency) or after radiotherapy. Since the 1970s, smell deficiency has been known in chronic alcohol users. Clinical studies have shown that 50% of chronic alcohol users have difficulty identifying smell and discontinuing alcohol has improved the olfactory function.

Some have only sensations.

Also, worth mentioning is the congenital lack of smell in certain malformative syndromes.

The psychiatric pathology occupies an important chapter of smell disorders, which, however, are not real but only a distorted perception of patients.

Autoimmune and endocrinological diseases can manifest with impaired olfactory acuity and I would mention pregnancy, hypothyroidism, Addison's disease, Cushing's syndrome, Sjögren's syndrome, systemic lupus erythematosus.

In ENT pathology, smell disorders are very common. Rhinitis and rhinosinusitis are the most common pathological circumstances that manifest with decreased olfactory acuity. Chronic rhinosinusitis with nasal polyps affects the smell through the conduction mechanism, through the presence of polyps in the olfactory region, which have an obstructive effect and prevent the transmission of stimuli to olfactory receptors. Nevertheless, there is also the hypothesis of the involvement of the neurosensory mechanism, through chronic inflammation of the mucosa of the olfactory region (especially in cases with recurrences and numerous surgeries). Olfactory neurons have the ability to regenerate when the inflammatory stimulus disappears, a conclusion that demonstrates the reversibility of smell-related symptoms in rhinosinusitis with nasal polyps. Smell impairment in patients with rhinosinusitis with nasal polyps is gradual, worsening with the accentuation of the underlying disease and has a variable evolution, being directly dependent on that of rhinosinusitis.

Post-viral olfactory impairment is defined as a sudden loss of smell after an acute episode of upper respiratory tract infection. Although upper respiratory tract infection heals spontaneously or with treatment, it can cause lingering and persistent smell disorders. There is a close connection in time between the viral respiratory infection and the appearance of smell disorder. Post-viral olfactory impairment was diagnosed in approximately a quarter of patients presented in various centres for the evaluation of smell and taste disorders[3].

It is more common in women, and the disease occurs mainly in decades four to six of life. The onset of acute upper respiratory tract infections is usually sudden, and the olfactory dysfunction is realized when the symptoms of the viral infection disappear. Most of the time, patients report a moderate-severe impairment of the olfactory function, but this is less severe than in post-traumatic cases.

This etiology determines not only the appearance of quantitative but also qualitative olfactory dysfunction. It has been shown that the incidence of post-infectious smell disorders varies depending on the season, the peak being found in February and March.

The mechanism underlying the onset of smell disorders after upper tract respiratory infections is not fully known. There are theories that stipulate that viral particles affect olfactory neurons and cause an immune response that also leads to damage to the olfactory neuroepithelium and / or olfactory pathways in the brain. Many viruses are able to penetrate the olfactory area of the nose and penetrate the brain. Among these we mention: parainfluenza viruses, coxsackie virus, adenoviruses, respiratory syncytial virus, coronavirus. Experimental intranasal infections with influenza A virus have led to increased apoptosis and fibrosis in the olfactory neuroepithelium.

Different studies have shown that the volume of the olfactory bulb decreases in patients with post-viral or post-traumatic olfactory disorders, which can be considered a predictor of smell recovery.

A topical and controversial topic, due to limited information, is the infection with the new coronavirus.

SARS-Cov-2 is a beta-coronavirus that has similarities to SARS-CoV. This virus has been shown to bind through glycoproteins expressed on its surface to the angiotensin-converting enzyme 2 receptor, which is distributed in the respiratory tract epithelium, lung parenchyma and other areas such as the gastrointestinal tract or endothelial cells.

The olfactory nerve pathway has been used by some coronaviruses in experimental models in rodents exposed to nasal inoculation. For example, after inhalation exposure to SARS-CoV, Netland et al. detected the coronavirus after 60 hours in the olfactory bulb and after four days its dissemination

was confirmed in the piriform cortex and the dorsal raphe nucleus and later in the brainstem[4]. Similar results were found in a Canadian study with another coronavirus, HCoV-OC43. In this case, by the fourth day of inoculation, the virus has already spread to the piriform cortex, brainstem and spinal cord.

According to the American Academy of Otorhinolaryngology – Head and Neck Surgery (AAO-HNS), anecdotal evidence indicates that anosmia and dysgeusia are princeps symptoms of the disease with the new coronavirus 2019 (COVID-19). AAO-HNS recommends that, for patients with no other respiratory diseases, such as allergic rhinitis, acute and chronic rhinosinusitis, the onset of anosmia or hyposmia, as well as dysgeusia, increase the suspicion of COVID-19 infection. The Centres for Disease Control and Prevention (CDC) have added taste or smell disorders to its list of symptoms that can occur 2-14 days after exposure to the COVID-19 virus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

It has been shown that head trauma ranks third in the etiological hierarchy of olfactory disorders. It is possible that the frequency to be even higher, in the acute phases the smell is not a primary parameter to evaluate. At the time of presentation in the emergency unit, the main concern of doctors is the investigation and medical or surgical treatment of the trauma, especially in cases of neurological impairment where the patient's life is threatened. Also, most of the time, patients do not immediately perceive the decrease or even the complete disappearance of smell.

Classically, *the assessment* of patients with olfactory disorders consists of rigorous anamnesis, complete ENT evaluation, paraclinical investigations (nasal endoscopic examination, nasal secretion for bacteriological and fungal examination, imaging investigations– craniofacial CT or MRI). To these are added psychophysical tests (dynamic olfactometry with n-Butanol, Snap and Sniff test) and the electric olfactory evoked potentials as an objective method. This evaluation and diagnostic protocol was established and used as a national first at the ENT&HNS Department, "Sfanta Maria" Hospital, since 2016.

Although the literature emphasizes the usefulness and importance of imaging investigations (brain and sinuses computed tomography, but especially brain MRI with the identification and measurement of the olfactory bulb), according to our experience, most patients are not investigated imagistically. The main reason is the financial one, because the imaging examinations have high costs that most of the patients cannot afford, and that medical insurance does not settle.

The treatment of olfactory disorders is individualized depending on the cause. Clinical and paraclinical evaluation are essential in establishing a correct therapeutic conduct.

The main therapeutic directions are represented by:

- Olfactory training – olfactory stimulation with the essence of rose, eucalyptus, lemon and clove, for a period of at least 3 months.
- Medical treatment according to etiology: antibiotics, steroidal / non-steroidal anti-inflammatory drugs, antivirals, etc.
- Surgical treatment of the cause (rhinosinusitis, tumors, etc.)
- Adjuvant treatments: oncological treatment.
- Psychological support to increase the quality of life of patients in whom the available treatments have failed or in those with congenital impairment.

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