Vision and hearing testing

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Snellen’s chart

Distant acuity is measured with Snellen’s chart. The chart is placed 5 m from the patient. Acuity is examined with one eye at a time. Glasses should be worn if the patient customarily uses them for distance. Reading glasses will often blur distant vision. Acuity is recorded as a fraction

\[
\text{Visus} /V/ = \frac{d}{D}
\]

- \(d\) – represents the distance to the chart
- \(D\) – represents the distance at which a normal eye can read the line

Thus 5 /10 means the patient is 5 m away and can read the line that a normal eye should read at 10 m.

By 5 / 50 is meant that he can read only the largest letter, ordinarily legible to the normal eye at 50 m. Lesser visual acuity than this may be recorded as hand movement /H.M./ or light perception /L.P./.

• Color vision deficiency is most commonly detected with special colored charts called the Ishihara Test Plates. On each plate is a number composed of colored dots. While holding the chart under good lighting, the patient is asked to identify the number. Once the color defect is identified, more detailed color vision tests may be performed.

• There is no treatment for color blindness. Those with mild color deficiencies learn to associate colors with certain objects and are usually able to identify color as everyone else. However, they are unable to appreciate color in the same way as those with normal color vision.
Ishihara Test

Both the normal and those with all sort of color vision deficiencies read it as 12.

The normal read this as 8. Those with red-green deficiencies read this as 3. Those with total color blindness cannot read any numeral.
Ishihara Test

The normal read this as 29. Those with red-green deficiencies read this as 70. Those with total color blindness cannot read any numeral.

Ishihara Test

The normal read this as 5. Those with red-green deficiencies read this as 3. Those with total color blindness cannot read any numeral.
**Ishihara Test**

The normal read this as 3. Those with red-green deficiencies read this as 5. Those with total color blindness cannot read any numeral.

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**Ishihara Test**

The normal read this as 15. Those with red-green deficiencies read this as 17. Those with total color blindness cannot read any numeral.
The normal read this as 74. Those with red-green deficiencies read this as 21. Those with total color blindness cannot read any numeral.

The normal read this as 6. The majority of those with color vision deficiencies cannot read them or read them incorrectly.
**Ishihara Test**

The normal read this as 45. The majority of those with color vision deficiencies cannot read them or read them incorrectly.

The normal read this as 5. The majority of those with color vision deficiencies cannot read them or read them incorrectly.
Ishihara Test

The normal read this as 7. The majority of those with color vision deficiencies cannot read them or read them incorrectly.

Ishihara Test

The normal read this as 16. The majority of those with color vision deficiencies cannot read them or read them incorrectly.
Ishihara Test

The normal read this as 73. The majority of those with color vision deficiencies can not read them or read them incorrectly.

Ishihara Test

The majority of those with red-green deficiencies read this as 5. The majority of the normal and those with total color blindness cannot read any numeral.
The majority of those with red-green deficiencies read this as 45. The majority of the normal and those with total color blindness cannot read any numeral.

The normal read this as 26. In Protanopia and strong Protanomalia only 6 is read, and in cases of mild Protanomalia the numeral is read, but the 6 is clearer than the 2. In Deuteranopia and strong Deuteranomalia only the 2 is read, and in the case of mild Deuteranomalia both numerals are read but the 2 is clearer than the 6.
**Ishihara Test**

The normal read this as 42. In Protanopia and strong Protanomalia only 2 is read, and in cases of mild Protanomalia the numeral is read, but the 2 is clearer than the 4. In Deuteranopia and strong Deuteranomalia only the 4 is read, and in the case of mild Deuteranomalia both numerals are read but the 4 is clearer than the 2.

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**Ishihara Test**

Both the normal and those with all sort of color vision deficiencies can trace the winding line between the two X’s.
**Slit Lamp Examination**

- The slit lamp is a microscope with a light attached that allows the doctor to examine your eye under high magnification. This instrument is primarily used to view the anterior structures of the eye such as the cornea, iris, and lens. However, with special lenses, it is possible to examine the vitreous and the back of the eye as well.

- The instrument’s name is derived from its adjustable light beam. By changing the width of the beam, the doctor can gather important detail about each eye structure.
Conjunctivitis

- **Conjunctivitis**, commonly known as *pink eye*, is an infection of the conjunctiva (the outer-most layer of the eye that covers the sclera). The three most common types of conjunctivitis are: *viral*, *allergic*, and *bacterial*. Each requires different treatments. With the exception of the allergic type, conjunctivitis is typically contagious.

Uveitis

- **Uveitis** is a general term that refers to inflammation or swelling of the eye’s structures responsible for its blood supply. These structures are collectively known as the uveal tract, and include the iris, ciliary body, and choroid. Uveitis is classified by the structures it affects, the underlying cause, and whether it is chronic (lasting more than 6 weeks), or acute in nature. There are four main categories of uveitis. Anterior uveitis (also known as iritis) involves the iris and ciliary body and is the most common type; intermediate uveitis affects the ciliary body, vitreous and retina; posterior uveitis involves the retina, choroid and optic nerve; and diffuse uveitis affects structures both in the front and back of the eye.
**Scleritis**

- Scleritis is an inflammatory disease that affects the conjunctiva, sclera, and episclera (the connective tissue between the conjunctiva and sclera). It is associated with underlying systemic diseases in about half of the cases. The diagnosis of scleritis may lead to the detection of underlying systemic disease. Rarely, scleritis is associated with an infectious problem.

- The affected area of the sclera may be confined to small nodules, or it may cause generalized inflammation. Necrotizing scleritis, a more rare, serious type, causes thinning of the sclera. Severe cases of scleritis may also involve inflammation of other ocular tissues.

**Iritis**

Iritis is an inflammatory problem of the iris, the colored part of the eye. It often occurs for unknown reasons, but it may be linked to certain diseases affecting the body, infections, previous eye surgery, or injury.

Iritis may affect one or both eyes. It is sometimes a chronic, recurring condition.

**Signs and Symptoms**
- Red eye
- Light sensitivity
- Pain that may range from aching or soreness to intense discomfort
- Small pupil
- Tearing
Perimetry

- To diagnose blindness in specific portion of the retina, chart the field of vision for each eye by a process called perimetry. This is done by having the subject look with one eye closed and the other eye looking toward a central spot directly in front of the eye.
- Then a small dot of light or a small object is moved back and forth in all areas of the field of vision, and the subject indicates when the spot of light or object can be seen and when it cannot.
- In all perimetry charts, a blind spot caused by lack of rods and cones in the retina over the optic disc is found about 15 degrees lateral to the central point of vision.

Goldman perimeter
Figure 51-6
Hemianopic chart, showing the field of vision for the left eye.

sharpest, most sensitive vision central zone (macular area of retina)
nasal (nose side)
temporal (ear side)

normal "blind spot"
outer margins of visual field
Pupil light reflexes (Hirschberg and Krimsky Tests)

Both of these tests are performed by simply shining a bright light into the patient's eyes and looking at the light in the pupils. When there are no alignment problems, the light reflection will be in approximately the same position in both pupils. However, if the patient has strabismus, the light will appear off-center in the crossed eye. This test is especially useful when examining young children.

Ophthalmoscopy

- An ophthalmoscope is an instrument used to examine the retina and vitreous. Ophthalmoscopy requires dilating the pupils with drops to give the doctor the best view inside the eye.

- There are two types of ophthalmoscopes: direct and indirect. The direct is a hand-held instrument with a battery powered light source. It also has a series of lenses that can be dialed in to focus the doctor's view of the retina. The direct ophthalmoscope is useful for examining the central retina.
Ophthalmoscopy

- The indirect ophthalmoscope can be used to examine the entire retina. This instrument is worn on the doctor’s head. While looking through the instrument’s magnifying glasses, a special lens is placed in front of the patient’s eye, allowing the doctor to see the retina clearly.

Fig. 1. Human retina as seen through an ophthalmoscope.
Glaucoma

Glaucoma is a disease caused by increased intraocular pressure (IOP) resulting either from a malformation or malfunction of the eye’s drainage structures. Left untreated, an elevated IOP causes irreversible damage to the optic nerve and retinal fibers resulting in a progressive, permanent loss of vision. However, early detection and treatment can slow, or even halt the progression of the disease.
Glaucoma

Common types of glaucoma

- **Open Angle**
  
  Open angle (also called chronic open angle or primary open angle) is the most common type of glaucoma. With this type, even though the anterior structures of the eye appear normal, aqueous fluid builds within the anterior chamber, causing the IOP to become elevated. Left untreated, this may result in permanent damage of the optic nerve and retina. Eye drops are generally prescribed to lower the eye pressure. In some cases, surgery is performed if the IOP cannot be adequately controlled with medical therapy.
**Glaucoma**

- **Acute Angle Closure**
  
  Only about 10% of the population with glaucoma has this type. Acute angle closure occurs because of an abnormality of the structures in the front of the eye. In most of these cases, the space between the iris and cornea is more narrow than normal, leaving a smaller channel for the aqueous to pass through. If the flow of aqueous becomes completely blocked, the IOP rises sharply, causing a sudden angle closure attack. While patients with open angle glaucoma don't typically have symptoms, those with angle closure glaucoma may experience severe eye pain accompanied by nausea, blurred vision, rainbows around lights, and a red eye. This problem is an emergency and should be treated by an ophthalmologist immediately. If left untreated, severe and permanent loss of vision will occur in a matter of days.
Glaucoma – signs and symptoms

Glaucoma is an insidious disease because it rarely causes symptoms. Detection and prevention are only possible with routine eye examinations. However, certain types, such as angle closure and congenital, do cause symptoms.

Angle Closure (emergency)
- Sudden decrease of vision
- Extreme eye pain
- Headache
- Nausea and vomiting
- Glare and light sensitivity

Congenital
- Tearing
- Light sensitivity
- Enlargement of the cornea

Glaucoma – detection and diagnosis

Because glaucoma does not cause symptoms in most cases, those who are 40 or older should have an annual examination including a measurement of the intraocular pressure. Those who are glaucoma suspects may need additional testing.

The glaucoma evaluation has several components. In addition to measuring the intraocular pressure, the doctor will also evaluate the health of the optic nerve (ophthalmoscopy), test the peripheral vision (visual field test), and examine the structures in the front of the eye with a special lens (gonioscopy) before making a diagnosis.

The doctor evaluates the optic nerve and grades its health by noting the cup to disc ratio. This is simply a comparison of the cup (the depressed area in the center of the nerve) to the entire diameter of the optic nerve. As glaucoma progresses, the area of cupping, or depression, increases. Therefore, a patient with a higher ratio has more damage.
Intraocular Pressure (IOP) - tonometer

The intraocular pressure, an important part of any eye exam, is measured with a special instrument called a tonometer. The IOP is determined by a balance of the eye's production and drainage of aqueous (the clear fluid inside the eye) from the anterior chamber into the trabecular meshwork. If the IOP is elevated, it can cause pressure within the eye to increase and damage the optic nerve. Since abnormal pressures usually don't cause symptoms, it's very important to have the pressure checked regularly.

Macular Degeneration

Age-related macular degeneration (ARMD) is a degenerative condition of the macula (the central retina). It is the most common cause of vision loss in the United States in those 50 or older, and its prevalence increases with age. AMD is caused by hardening of the arteries that nourish the retina. This deprives the sensitive retinal tissue of oxygen and nutrients that it needs to function and thrive. As a result, the central vision deteriorates.
Macular Degeneration

Macular degeneration varies widely in severity. In the worst cases, it causes a complete loss of central vision, making reading or driving impossible. For others, it may only cause slight distortion. Fortunately, macular degeneration does not cause total blindness since it does not affect the peripheral vision.

This example demonstrates what a patient with advanced macular degeneration sees.

What is the difference between wet and dry macular degeneration?

AMD is classified as either wet (neovascular) or dry (non-neovascular). About 10% of patients who suffer from macular degeneration have wet AMD. This type occurs when new vessels form to improve the blood supply to oxygen-deprived retinal tissue. However, the new vessels are very delicate and break easily, causing bleeding and damage to surrounding tissue.
Patient with wet macular degeneration develop new blood vessels under the retina. This causes hemorrhage, swelling, and scar tissue but it can be treated with laser in some cases.

Dry macular degeneration, although more common, typically results in a less severe, more gradual loss of vision.
Diabetic Retinopathy

How does diabetes affect the retina?

Patients with diabetes are more likely to develop eye problems such as cataracts and glaucoma, but the disease’s affect on the retina is the main threat to vision. Most patients develop diabetic changes in the retina after approximately 20 years. The effect of diabetes on the eye is called diabetic retinopathy.

Over time, diabetes affects the circulatory system of the retina. The earliest phase of the disease is known as background diabetic retinopathy. In this phase, the arteries in the retina become weakened and leak, forming small, dot-like hemorrhages. These leaking vessels often lead to swelling or edema in the retina and decreased vision.

The next stage is known as proliferative diabetic retinopathy. In this stage, circulation problems cause areas of the retina to become oxygen-deprived or ischemic. New, fragile, vessels develop as the circulatory system attempts to maintain adequate oxygen levels within the retina. This is called neovascularization. Unfortunately, these delicate vessels hemorrhage easily. Blood may leak into the retina and vitreous, causing spots or floaters, along with decreased vision.
**Diabetic Retinopathy**

In the later phases of the disease, continued abnormal vessel growth and scar tissue may cause serious problems such as retinal detachment and glaucoma.

**Signs and Symptoms**

The affect of diabetic retinopathy on vision varies widely, depending on the stage of the disease. Some common symptoms of diabetic retinopathy are listed below, however, diabetes may cause other eye symptoms.

- Blurred vision (this is often linked to blood sugar levels
- Floaters and flashes
- Sudden loss of vision
Diabetic Retinopathy

Detection and Diagnosis

Diabetic patients require routine eye examinations so related eye problems can be detected and treated as early as possible. Most diabetic patients are frequently examined by an internist or endocrinologist who in turn work closely with the ophthalmologist.

The diagnosis of diabetic retinopathy is made following a detailed examination of the retina with an ophthalmoscope. Most patients with diabetic retinopathy are referred to vitreo-retinal surgeons who specialize in treating this disease.
**CONDUCTIVE HEARING LOSS**

1. External otitis (acute and chronic)
2. Wax
3. Exostoses/osteomas
4. Acute Otitis Media
5. Otitis Media with Effusion
6. TM perforations
7. Chronic Suppurative Otitis Media (CSOM)
   a. Safe or mucosal CSOM
   b. Cholesteatoma
8. Otosclerosis

**SENSORINEURAL HEARING LOSS**

1. Occupational or Noise Induced Hearing Loss (NIHL)
2. Presbycusis
3. Menière’s Disease
4. Ototoxicity (Systemic and Topical)
5. Cochlear Otosclerosis
6. Trauma
7. Acoustic neuromas (vestibular schwannomas)
8. Sudden Sensorineural Loss

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**The RINNE Test**

- Compares air and bone conduction hearing
- Place the vibrating tuning fork on the base of the mastoid bone and ask patient to tell you, when the sound is no longer heard
- Note the time interval and immediately move the tuning fork to auditory meatus and ask the patient to tell you the sound is no longer heard
The RINNE Test

- Normal hearing patients will note air conduction twice as long as bone conduction
- With conductive hearing loss, bone conduction sound is heard longer than or equally as long as air conduction
- With sensorineural hearing loss, air conduction is heard longer than bone conduction in affected ear, but less than 2:1 ratio

RINNE's Test - procedure

- Strike the tuning fork *(Not too loudly!)* Place the handle of the vibrating tuning fork on the patient's mastoid process.
RINNE's Test - procedure

- Instruct the patient to inform you when they can no longer hear the tuning fork. When the patient can no longer hear the tuning fork, place the tuning fork in line with the external meatus.

Now ask if the patient can hear the tuning fork when placed in front of their external meatus. Normally the note is audible in the external meatus (Rinne's positive).

With conductive deafness, the amplification system in the middle ear is defective. This means that no note is audible at the external meatus (Rinne's negative).

With complete unilateral sensorineural hearing loss it is expected that both air and bone conduction do not occur in the affected ear. However a patient with complete unilateral hearing loss may hear the vibrating tuning fork when placed on their mastoid and hear nothing when placed at the affected external auditory meatus. This is because with bone conduction (i.e. across the patient's skull), the sound is conducted to the other ear when it is heard. Therefore the patient in this case will produce a Rinne's negative result. However since they do not have a conductive deafness this is known as a false negative Rinne's.
RINNE’s Test - procedure

(With partial sensorineural deafness patients may hear the tuning fork at the external meatus. With sensorineural deafness both air and bone conduction are equally reduced, so that air conduction is better than bone conduction)

The WEBER Test

- 1) Distinguishes between conductive and sensorineural hearing.
- 2) Place the vibrating fork on the middle of the patient’s head
- 3) Ask patient if the sound is heard better in one ear or the same in both ears
  - A) If hearing is normal, the sound is symmetrical with no lateralization
  - B) Sound localizes toward the poor ear with a conductive loss
  - C) Sound localizes toward the good ear with a sensorineural hearing loss
WEBER’s Test - procedure

- Strike the 512 Hz tuning fork again. Place the base of the tuning fork in the centre on the patient’s forehead.

WEBER’s Test - procedure

- Ask the patient to inform you where they hear the sound the best? Either ear or equally?

- In normal subjects the sound is conducted by bone to both ears, where it is heard equally.

- If the patient has unilateral conductive deafness, background noise normally picked up by that ear is not heard. Given that bone conduction is equal in both ears, means that the hearing defect masks out background noise on that side, the tone is in fact heard loudest on the side of the defective ear.

- If a patient has unilateral sensorineural deafness, both air and bone conduction are reduced. Thus in the sound will be heard loudest in the good ear.
### WEBER’s Test - procedure

<table>
<thead>
<tr>
<th></th>
<th>Rinne’s</th>
<th>Weber’s (Loudest in...)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal hearing</td>
<td>+ve</td>
<td>Both ears</td>
</tr>
<tr>
<td>Left conductive deafness</td>
<td>-ve</td>
<td>Left ear</td>
</tr>
<tr>
<td>Left complete sensorineural deafness</td>
<td>-ve</td>
<td>Right ear</td>
</tr>
</tbody>
</table>

#### Otoscopy

- **An** annulus fibrosus
- **Lpi** long process of incus - sometimes visible through a healthy translucent drum
- **Um** umbo - the end of the malleus handle and the centre of the drum
- **Lr** light reflex - antero-inferiorly
- **Lp** Lateral process of the malleus
- **At** Attic also known as pars flaccida
- **Hm** handle of the malleus
Otoscope

- Provides illumination for examining the external auditory canal and tympanic membrane
- Inspect auditory canal noting: cerumen, color, lesions, discharge or foreign bodies
- Inspect the tympanic membrane for landmarks, perforations, color
The most widely used test to assess hearing is Pure Tone Audiometry in which an audiometer generates pure tone signals of frequency 125Hz, 250Hz, 500Hz, 1,2,4 and 8kHz at variable intensities ranging from -10 dB to +120 dB usually in steps of 5dB.

Signals of increasing intensity at each frequency are presented to the person tested who indicates when the test tone is heard. The hearing threshold levels are usually plotted on a graph or audiogram with sound intensity (dB) on the y (vertical) axis and the frequency (Hz) along the x (horizontal) axis. Standard symbols are used to denote right (o) and left (x) ears for air conduction and right ([ or ∆) or left (] or ∆) ears for bone conduction.

The hearing threshold is defined as the quietest sound heard by the person when being tested. A normally hearing person would expect to have a threshold of 20dB or better and this represents no hearing loss on the audiogram.

It should be noted that audiometry is a subjective test of hearing.
Air Conduction

- Air Conduction assesses the function of both the conduction (outer and middle ear) and sensorineural (cochlea and auditory nerve) components of the ear. To measure air conduction (AC), the person wears headphones and the signal passes by air conduction through the outer and middle ear. It is then transmitted to the inner ear, auditory nerve and auditory cortex of the brain.

Bone Conduction

- Bone Conduction (BC) assesses the function of the cochlea and auditory nerve. To measure bone conduction, the signal stimulates the cochlea directly by the application of the vibratory stimulus to the skull.
### Selected Possible Causes of Smell Disturbance

<table>
<thead>
<tr>
<th>Common causes</th>
<th>Less common causes</th>
<th>Uncommon causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal and sinus disease (e.g., allergic or vasomotor rhinitis, chronic sinusitis, nasal polyps, adenoid hypertrophy)</td>
<td>Medications</td>
<td>Neoplasm or brain tumor (e.g., osteoma, olfactory groove or cribiform plate meningioma, frontal lobe tumor, temporal lobe tumor, pituitary tumor, aneurysm, esthesioneuroblastoma, melanoma, squamous cell carcinoma)</td>
</tr>
<tr>
<td>Head trauma (e.g., frontal skull fracture, occipital injury, nasal fracture)</td>
<td>Cocaine abuse (intranasal)</td>
<td>Psychiatric conditions (e.g., malingering, schizophrenia, depression, olfactory reference syndrome)</td>
</tr>
<tr>
<td>Neurodegenerative disease (e.g., Alzheimer’s disease, Parkinson’s disease, multiple sclerosis)</td>
<td>Toxic chemical exposure (e.g., benzene, benzol, butyl acetate, carbon disulfide, chlorine, ethyl acetate, formaldehyde, hydrogen selenide, paint solvents, sulfuric acid, trichloroethylene)</td>
<td>Endocrine disorders (e.g., adrenocortical insufficiency, Cushing’s syndrome, diabetes mellitus, hypothyroidism, primary amenorrhea, pseudohypoparathyroidism, Kallmann’s syndrome, Turner’s syndrome, pregnancy, epilepsy (olfactory aura))</td>
</tr>
<tr>
<td>Age</td>
<td>Industrial agent exposure (e.g., ashes, cadmium, chalk, chromium, iron carbonyl, lead, nickel, silicone dioxide)</td>
<td>Congenital conditions (e.g., congenital anosmia, Kallmann’s syndrome)</td>
</tr>
</tbody>
</table>

### Antibiotics
- Ampicillin
- Azithromycin (Zithromax)
- Ciprofloxacin (Cipro)
- Clarithromycin (Biaxin)
- Griseofulvin (Grisactin)
- Metronidazole (Flagyl)
- Ofloxacin (Flonox)
- Tetracycline

### Antihypertensives and cardiac medications
- Acetazolamide (Diamox)
- Amiloride (Midamor)
- Betaxolol (Betapril)
- Captopril (Capoten)
- Diltaizem (Cardizem)
- Enalapril (Vasotec)
- Hydrochlorothiazide (Esidix) and combinations
- Nifedipine (Procardia)
- Nitroglycerin
- Propranolol (Inderal)
- Spironolactone (Aldactone)

### Anti-inflammatory agents
- Auranofin (Ridaura)
- Colchicine
- Dexamethasone (Decadron)
- Gold (Mesylate)
- Hydrocortisone
- Penicillamine (Cuprimine)

### Antineoplastics
- Cylophosphamide (Cytoxan)
- Doxorubicin (Adriamycin)
- Methotrexate (Rheumatrex)
- Vinristine (Oncovin)

### Antihistamines and decongestants
- Carbinoxamine (Famotidine)
- Loradamine (Glaritin)
- Pseudoephedrine

### Antipsychotics
- Clozapine (Clozaril)
- Trifluoperazine (Stelazine)

### Antithyroid agents
- Methimazole (Tapazole)
- Propylthiouracil

### Lipid-lowering agents
- Fluvastatin (Lescol)
- Lovastatin (Mevacor)
- Pravastatin (Pravachol)

### Muscle relaxants
- Baclofen (Lyrica)
- Dantrolene (Dantrium)

### Antidepressants
- Amitriptyline (Elavil)
- Clomipramine (Anafranil)
- Desipramine (Norpramin)
- Doxepin (Sinequan)
- Imipramine (Tofranil)
- Nortriptyline (Pamelor)
- Lithium

### Anticonvulsants
- Carbamezepine (Tegretol)
- Phenytoin (Dilantin)

### Antibiotics
- Ampicillin
- Azithromycin (Zithromax)
- Ciprofloxacin (Cipro)
- Clarithromycin (Biaxin)
- Griseofulvin (Grisactin)
- Metronidazole (Flagyl)
- Ofloxacin (Flonox)
- Tetracycline
## Selected Possible Causes of Taste Disturbance

<table>
<thead>
<tr>
<th>Common causes</th>
<th>Less common causes</th>
<th>Uncommon causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral and perioral infections (e.g., candidiasis, gingivitis, herpes simplex, periodontitis, salivary gland)</td>
<td>Nutritional factors (e.g., vitamin deficiency [B3, B12], trace metal deficiency [zinc, copper], malnutrition, chronic renal failure, liver disease [including cirrhosis], cancer, acquired immunodeficiency syndrome)</td>
<td>Psychiatric conditions (e.g., depression, anorexia nervosa, bulimia)</td>
</tr>
<tr>
<td>Bell’s palsy</td>
<td>Tumor or lesions associated with taste pathways (e.g., oral cavity, neoplasm of skull base)</td>
<td>Epilepsy (gustatory aura)</td>
</tr>
<tr>
<td>Medications</td>
<td>Head trauma</td>
<td>Migraine headache (gustatory aura)</td>
</tr>
<tr>
<td>Oral appliances (e.g., dentures, filling materials, tooth prosthetics)</td>
<td>Toxic chemical exposure (e.g., benzene, benzal, butyl acetate, carbon disulfide, chlorine, ethyl acetate, formaldehyde, hydrogen selenide, paint solvents, sulfuric acid, thriehyrene)</td>
<td>Sjogren’s syndrome</td>
</tr>
<tr>
<td>Dental procedures (e.g., tooth extraction, root canal)</td>
<td>Industrial agent exposure (e.g., chromium, lead, copper)</td>
<td>Multiple sclerosis</td>
</tr>
<tr>
<td>Age</td>
<td>Radiation treatment of head and neck</td>
<td>Endocrine disorders (e.g., adrenocortical insufficiency, Cushing’s syndrome, diabetes mellitus, hypothyroidism, panhypopituitarism, pseudohypoparathyroidism, Kallmann’s syndrome, Turner’s syndrome)</td>
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