

Dry mouth and nose in the older patient

What every PCP should know

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Dry mouth and dry nose are common complaints among the older population. Dry mouth can be attributed to medical conditions and other underlying causes, whereas dry nose is usually associated with age-related changes in nasal physiology and structure. In both cases, medications can contribute to dryness, so a proper evaluation includes a careful drug review. Management of dry mouth includes hydration and use of mouthwash, sugarless gum, candy, and saliva substitutes. Dry nose can be managed with nasal sprays that moisten the nasal cavity.

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Dryness in the mouth and nose are common among older persons, and although these symptoms may represent mere manifestations of aging, they may also signal significant underlying medical conditions. In this second part of the series, Age-related disorders of the ear, nose, and throat, the authors address the subject of dry mouth and dry nose in the older population.

Dry mouth

Xerostomia, or oral dryness, is a common subjective complaint among older persons. Age-related decreases in submandibular and sublingual gland function are rarely physiologically significant and parotid salivary output

remains stable throughout life. Thus, xerostomia is not a consequence of normal aging and warrants attention as a signal to possible underlying conditions. Although it is often related to salivary gland hypofunction, not all patients who complain of xerostomia have demonstrable salivary dysfunction. Because there are numerous causes of xerostomia, proper diagnosis and treatment require a basic understanding of salivary gland anatomy.

Salivary gland anatomy

The major salivary glands exist as three paired structures: the parotid, submandibular, and sublingual glands (figure 1). There are hundreds of minor salivary glands located throughout the oral cavity. The saliva produced by the major and minor salivary glands serves a fundamentally important role in the production of speech, swallowing, and oral protection. Cumulatively these glands are responsible for producing up to 1.5 liters of saliva every 24 hours.¹ Substances contained within saliva include plasma cells, mucin, calcium, phosphorous, and lysozymes. Plasma

cells play an important immunologic role by producing immunoglobulin A, which provides the primary defense mechanism against local mucosal infections. Immunoglobulin A is transported in the saliva and neutralizes foreign substances to prevent their systemic access. Mucin offers the oral mucosa mechanical protection from trauma and dehydration. Calcium and phosphorous provide a protective environment for dental enamel, whereas other substances, such as lysozyme, lactoferrin, and peroxidases, help maintain control of local bacterial flora. Any age-, medication-, or disease-related changes that reduce salivary quality or quantity can seriously alter the patient's quality of life by affecting taste and the ability to eat, talking, local control of infections, and dental and periodontal disease.²

Each of the major salivary glands (ie, parotid, submandibular, and sublingual) produces a different quality of saliva. The parotid gland produces serous saliva, the sublingual gland produces much thicker, more resilient saliva, and the submandibular gland produces a mixture of both types. The submandibular and sublingual glands provide basal salivary production. These glands tend to secrete at a constant rate, except during times of oral ingestion, when secretion increases. Increased serous salivary secretion is provided by the parotid gland, which is stimulated to secrete immediately before and during meals. Parotid secretions diminish following ingestion.

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Diagnosis

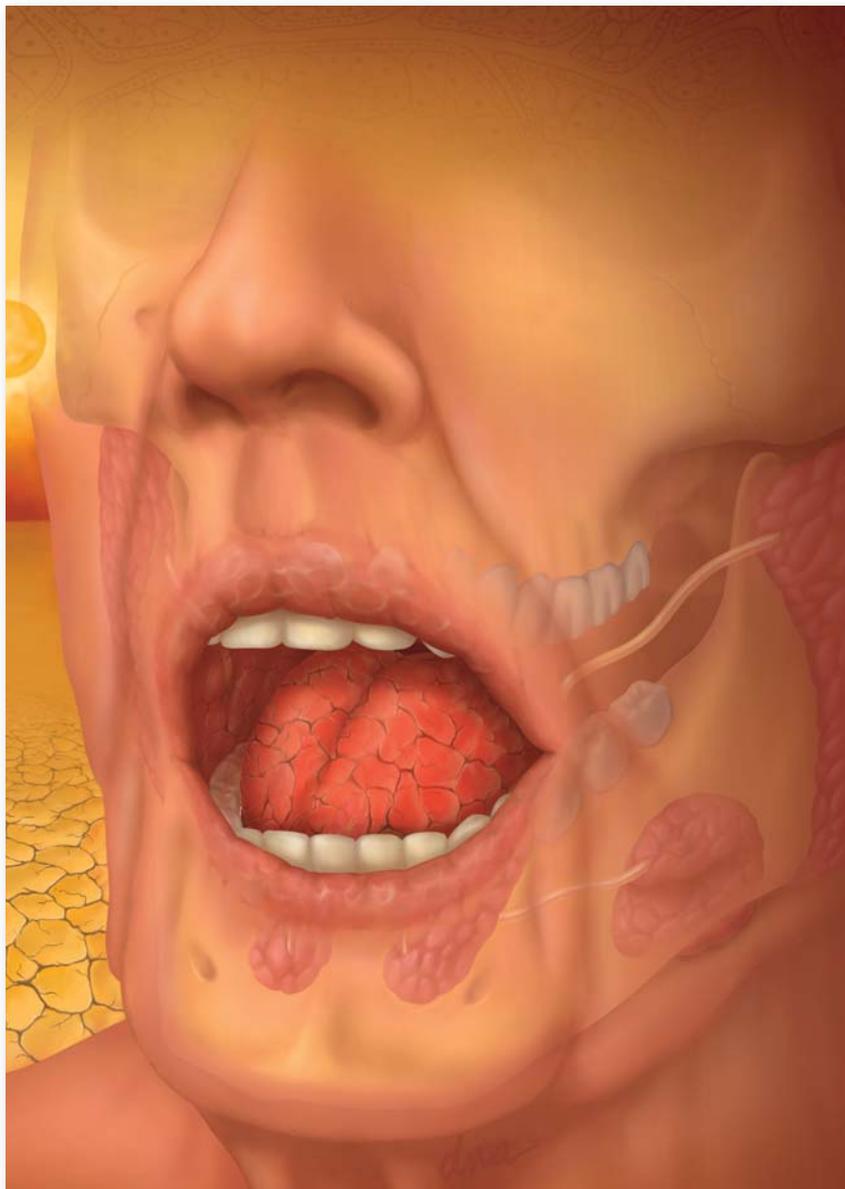
Xerostomia can be attributed to one of four main causes:

- CNS conditions and conditions that affect autonomic outflow pathways
- medication side effects
- salivary gland complications/autoimmunity
- electrolyte or fluid imbalance.³

CNS conditions. Emotional factors including fear, excitement, and stress can alter central nervous salivary stimulation. In older and chronically ill populations, depression is one of the most common emotional triggers of xerostomia. Neural neoplasms and Parkinson's disease may also play a role in decreasing central salivary stimulation.⁴ Encephalitis, intracranial tumors, cerebral vascular disease, and neurosurgical procedures may affect autonomic outflow pathways and contribute to dry mouth.

Medication side effects. More than 500 prescription and over-the-counter medications can cause dry mouth. Medications that produce anticholinergic effects are the most common contributors to dry mouth. When reviewing a patient's medication profile, pay attention to medications that fall into the "anti" medication categories (eg, anticonvulsants, antidepressants, antipsychotics), many of which contribute to dry mouth (table 1).⁵ The neurotransmitter acetylcholine acts at the terminal synaptic level to control stimulation of salivary secretion. Drugs that block acetylcholine may cause anticholinergic effects such as tachycardia, cycloplegia, urinary retention, anhidrosis, and xerostomia.⁶ Thus, initial evaluation for xerostomia requires review of the patient's medication profile and potential drug side effects.

Salivary gland complications. Autoimmune diseases may affect salivary tissue and diminish salivary gland function.⁷ Sjögren's syndrome is the most common salivary gland disorder that causes dry mouth in older persons. It is an autoimmune disease histologically characterized by a lymphocytic



Dry mouth warrants attention as a signal to possible underlying causes, such as CNS conditions, medication side effects, salivary gland complications, and fluid imbalance. Dry nose typically results from normal age-related changes.

Illustration for Geriatrics by David Baker

and histiocytic salivary gland infiltrate that leads to atrophy of the exocrine glands. Affected patients will exhibit autoimmune autoantibodies to extractable nuclear proteins such as SS-A and SS-B. Patients with Sjögren's syndrome experience dry eyes, dry mouth, parotid swelling, and may present with chronic or intermittent bacterial sialadenitis (ie, infection of the salivary gland). Symptomatic patients will also exhibit abnormal tear flow. Symptoms associated with Sjögren's

syndrome are often so insidious in onset and progression that the disease goes undiagnosed. If Sjögren's syndrome is suspected, the diagnosis can be confirmed with a minor salivary gland biopsy from the inner surface of the lower lip. Additional autoimmune diseases that can affect salivary outflow are summarized in table 2.⁸

Chronic sialadenitis, which usually affects only one gland (typically the parotid), may lead to decreased saliva production. Typical causes include

Dry mouth and nose

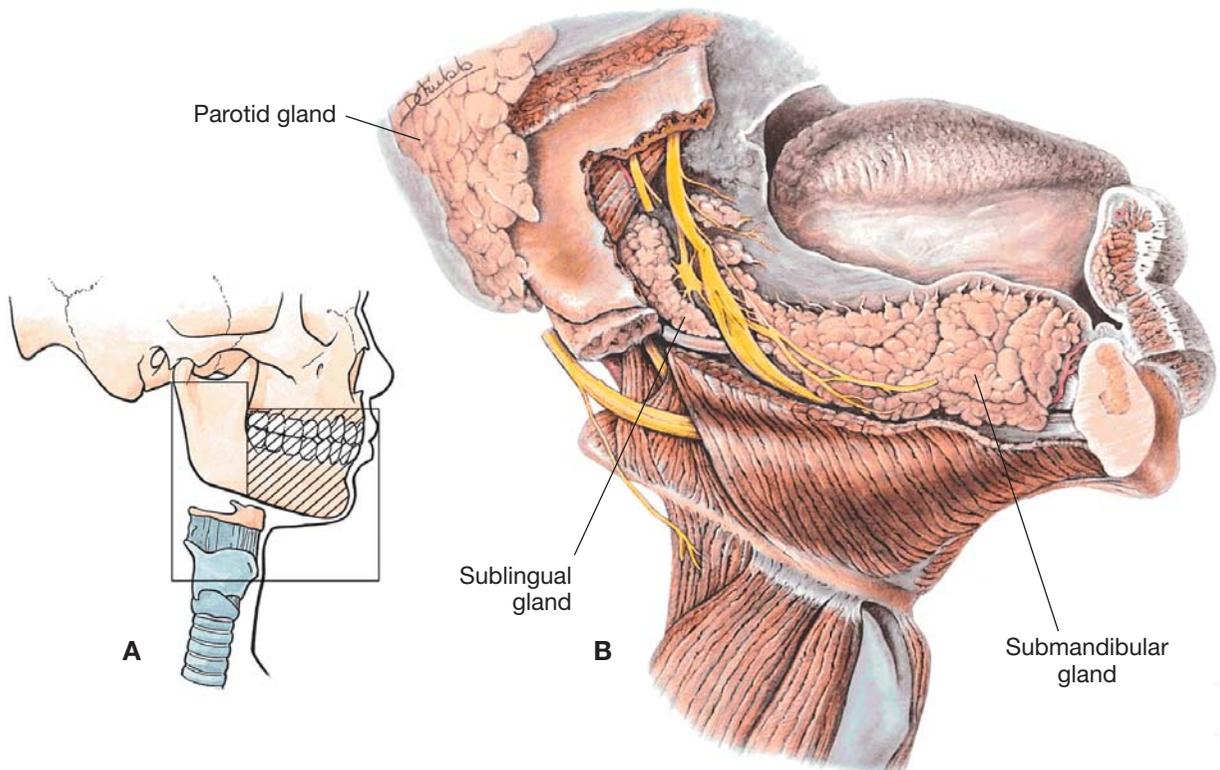


Figure 1 View of all three major salivary glands (B). The mandible has been cut away to allow the glands to be seen (A).

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sialoliths (salivary stones) and tumors that obstruct salivary outflow. Primary infections of the salivary glands caused by retrograde bacterial migration from the oral cavity can also cause chronic sialadenitis. The parotid gland is most often affected, presumably from the inferior bacteriostatic activity of the parotid saliva. Stasis of salivary secretions, poor oral hygiene, or both, can increase the risk of infection. In addition, drugs and drug combinations (table 1) may increase the risk of in-

fection by slowing salivary flow. In the older population, chronic sialadenitis is most often associated with *Staphylococcus aureus*, but *Streptococcus* species can also cause the condition.⁹ Management of infections involving the salivary glands requires treatment with systemic oral antibiotics as well as rehydration. Sialagogues, such as lemon drops, stimulate glandular secretions (particularly parotid secretions) and may help cleanse the salivary ducts.

Radiation therapy for head and neck

cancers can cause severe long-term xerostomia. Radiotherapy causes irreversible, progressive salivary atrophy and fibrosis that impairs the secretory function of the salivary glands. The volume of saliva production is reduced, and the quality of saliva changes, resulting in saliva that is viscous and stringy. This development causes patient discomfort and reduces oral protection. Poor dentition in combination with the effects of radiation therapy may give rise to osteoradionecrosis of the mandible or maxilla, a potentially devastating complication of treatment. Fortunately, any salivary tissue that is shielded from radiation retains the ability to grow and produce new tissue, leading to a decrease in symptoms over several months depending on the dosage of the radiation and the effectiveness of the shield.¹⁰

Electrolyte or fluid imbalance. Poor fluid intake impedes the ability of the glands to produce saliva, thus reducing the bacteriostatic environment within the glands and salivary ducts. Acute sialadenitis is more likely to arise in this setting. Conditions characterized by fluid

Table 1 Medication categories associated with dry mouth

Analgesics	Antipruritics
Anticholinergics	Antipsychotics
Anticonvulsants	Antispasmodics
Antidepressants	Appetite suppressants
Antiemetics	Cold medications
Antihistamines	Diuretics
Antihypertensives	Expectorants
Antinauseants	Muscle relaxants
Antineoplastics	Sedatives
Antiparkinson medications	

Source: Prepared for Geriatrics by Benjamin A. Bassichis, MD, and Bradley F. Marple, MD using information from reference 5.

loss, such as vomiting, diarrhea, sweating, or hemorrhage can cause xerostomia. The ill effects of dehydration can be addressed by having patients consume 6 to 8 glasses of fluids per day. They should drink noncaffeinated beverages, and keep consumption of caffeinated coffees, teas, and sodas to a minimum because of the diuretic effects of caffeine.

Treatment of xerostomia

Xerostomia can be frustrating to treat because symptoms are often controlled but not abated. Successful treatment follows a thorough medical evaluation and is directed at the underlying cause.

Drug therapy can be effective if the patient's xerostomia is the result of an underlying disease or metabolic state, such as radiation therapy (table 3). Oral pilocarpine (Salagen), 5 mg tid, can stimulate salivary flow in some patients, but may also cause flushing, sweating, tachycardia, and worsening of glaucoma. Pilocarpine should be withdrawn if it does not produce an adequate response. For some patients, it may take 4 to 6 weeks before any changes are seen. Mouthwashes are useful for alleviating oral discomfort. Over-the-counter saliva substitutes are also available, although many contain sorbitol, which can worsen xerostomia.¹¹ Salix, or 5% citric acid in glycerine, used 3 to 4 times per day, can also provide symptomatic relief and is the saliva substitute that is preferred by our patients.

Treat medication-induced xerostomia by decreasing the dosage of the offending agent or changing the medication. Patients who cannot tolerate a different medication or in whom a lower dose of the medication would be ineffective should increase fluid intake and use a saliva substitute.

If the patient's xerostomia does not resolve and palliative care is necessary to manage the condition, cholinergics (eg, pilocarpine, 5 mg tid) can be used to stimulate the glands to produce more saliva. If fluid loss is the cause and is the result of a medical condition such as diabetes or diarrhea, controlling the con-

Table 2 Systemic causes of dry mouth

Condition	
Diabetes mellitus	Systemic amyloidosis
Rheumatoid arthritis	Systemic lupus erythematosus
Sjögren's syndrome	

Source: Prepared for Geriatrics by Benjamin A. Bassichis, MD, and Bradley F. Marple, MD using information from reference 8.

Table 3 Pharmacologic treatments for dry mouth and dry nose

Dry mouth treatments	Dosage	Comments
Cholinergic		
Pilocarpine HCl (Salagen)	5 mg tid	May cause flushing, sweating, tachycardia, and worsening glaucoma
OTC saliva substitute		
Salix	Suck on tablets 3 to 4 times/day	Contains sorbitol, which could worsen dryness
Dry nose treatments		
Expectorant		
Guaifenesin (Fenesin)	Begin with 600 mg bid and increase as needed to 1,200 mg bid	May cause GI upset
OTC nasal spray		
Afrin saline	2 to 6 sprays in each nostril every 2 hrs	Use in conjunction with guaifenesin
OTC mucolytic		
Alkalol liquid	Use as oral rinse at full or half strength a few times per day	Can also be used as a nasal rinse

OTC: Over-the-counter
 Source: Prepared for Geriatrics by Benjamin A. Bassichis, MD, and Bradley F. Marple, MD

dition and increasing the fluid in the diet will usually resolve the problem.

In addition, general recommendations can be made to help patients manage their dry mouth symptoms, regardless of the cause. The box, recommendations for managing dry mouth (page 32), can be copied and given to patients. Sugarless gum or candy may provide some relief for patients with xerostomia by stimulating saliva production. Encourage patients to alter their diets to avoid bulky and spicy foods and carbonated and alcoholic beverages. Patients should main-

tain optimal air humidification in their homes, especially during sleep. Regular dental visits can help prevent conditions that precipitate xerostomia, such as dental caries and gingivitis.

Geriatric rhinitis

Rhinitis is an inflammation of the mucous membranes in the nose. In younger patients, rhinitis causes an overproduction of mucus that leads to a runny nose. Rhinitis in older patients, or geriatric rhinitis, however, causes dry mucus that leads to a dry nose. Unlike dry mouth, which can be attributed to a

Dry mouth and nose

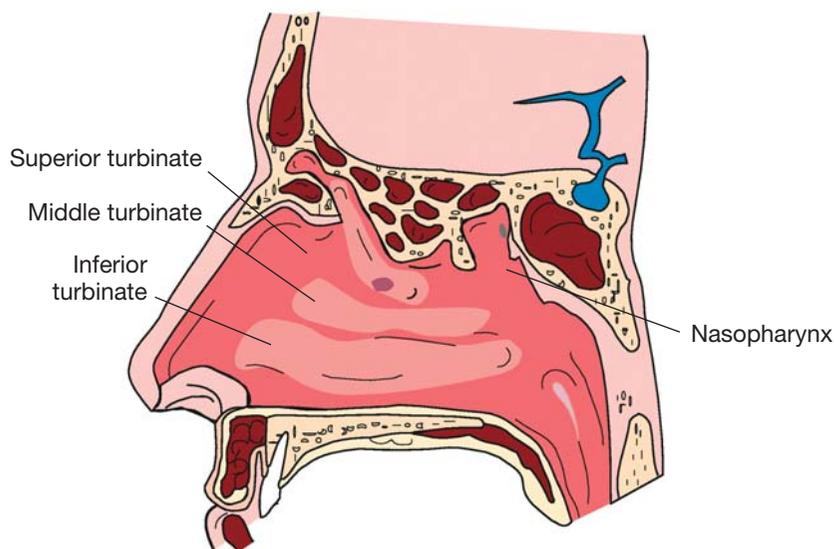


Figure 2 View of lateral nasal sidewall showing the location of the turbinates.

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number of underlying causes, geriatric rhinitis typically results from normal age-related changes. Age-related nasal problems are often underestimated and under-recognized and have been largely ignored within the otolaryngologic and geriatric literature. Cosmetic and structural changes are briefly discussed in the literature, but functional issues are largely overlooked even though age-related nasal complaints are common in the older population. Genetics and environmental influences including illness, trauma, and medical therapy alter the pathophysiology of the nose, resulting in nasal dryness.

Nasal pathophysiology

Glandular atrophy is a common age-related nasal change. In younger patients, the goblet cells and submucosal serous glands produce approximately one liter of mucus per day. Most patients do not notice the mucus as long as the viscosity of these secretions remains relatively low. Age-related atrophy of the serous glands, however, results in thicker mucus. This mucus becomes more conspicuous to patients as it migrates into the nasopharynx and causes chronic cough, repeated throat clearing, or a persistent feeling of a foreign body lodged in the nose.

Changes in the structural integrity of the nose are also attributed to nor-

mal aging. As the fibrous support mechanisms weaken with age, the nose begins to lengthen and droop. These changes may cause the nasal valve region, which is bounded by the septum, inferior turbinates, and upper lateral cartilages, to narrow (figure 2). A corresponding increase in airway resistance may cause nasal dryness.

Age-related vascular changes in the nose can also cause dryness.¹² Microvascular alterations can occur in the nose as they do in other parts of the body. For instance, the turbinate blood supply helps moisten and warm inspired air. As submucosal vessels become less patent, crusting and dryness develop within the nasal cavity. Furthermore, venous obstruction may give rise to nasal edema, which can be exacerbated by a patient's body position. When the patient is upright, gravity assists the flow of blood out of the turbinates, thus reducing submucosal engorgement and congestion. When the patient is lying flat, however, the turbinates remain congested, causing a feeling of obstruction.

Medications can also cause nasal dryness, so review of the patient's medication regimen and medical history should be part of the work-up. Antihypertensive therapies such as reserpine, hydralazine, prazosin, methyldopa, and beta blockers can cause nasal dryness.

Other medications that can cause dryness include thioridazine, alprazolam, perphenazine, and amitriptyline.

Antihistamines, especially first-generation medications such as loratadine, should not be used in patients with geriatric rhinitis because these agents dry out the nose and exacerbate the condition. For patients with allergies who require an antihistamine, select a third-generation agent such as cetirizine (Zyrtec) or fexofenadine (Allegra) because they do not produce the same drying effects as first- and second-generation antihistamines. Decongestants dry out the nose and are not recommended in patients with geriatric rhinitis. Nasal steroids can also cause dryness and crusting and should be used cautiously.

Management of geriatric rhinitis

Management of rhinitis should begin by explaining to patients that treatment of nasal dryness is directed at relieving symptoms and is sometimes only partially successful. The main goal of treatment is to moisten the nasal mucosa. The submucosal glands can be stimulated by medications to produce thin, watery secretions, and topical saline can be introduced from an external source such as a nasal spray.

Guaifenesin (Fenesin) is the most ef-

Recommendations for managing dry mouth

- Chew sugarless gum or suck on candy or lemon drops to stimulate saliva production
- Avoid eating bulky (eg, well-done steak) and spicy foods and drinking carbonated, caffeinated, and alcoholic beverages
- Use an air humidifier at home, especially during sleep
- Visit your dentist regularly to prevent dental caries and gingivitis, which can cause dry mouth

Source: Prepared for Geriatrics by Benjamin A. Bassichis, MD, and Bradley F. Marple, MD

fective medication for increasing nasal mucus secretions. In doses greater than 2,400 mg/d it is an emetic, but at doses \leq 2,400 mg/d, it is a mucolytic and expectorant. Guaifenesin can be given twice a day, beginning with 600 mg bid and increasing as needed to improve efficacy. An over-the-counter saline spray can also be used to increase moisture. Ideally, the nasal spray should be used in conjunction with guaifenesin. If additional topical therapy is necessary, an over-the-counter mucolytic agent, such as Alkalol liquid, can be given with saline. Pulsed irrigators can be used to cleanse and moisten areas deep within the nasal cavity. For patients who do not obtain adequate relief from regular pulsed irrigator spray heads, the Grossan nasal irrigator can be attached to a Waterpik to accomplish this cleansing.¹³ If the Grossan nasal irrigator is necessary, refer patients to an ENT specialist, who can provide basic instructions on how to use the device and Waterpik at home.

Conclusion

Age-related, medication-related, and disease-related changes in saliva production and nasal function can be problematic for the older population. Xerostomia is not a normal part of aging. Medical conditions, medications, salivary gland changes, and dehydration should be considered when patients present with xerostomia so that treatment can be directed at the underlying cause. Nasal dryness, on the other hand, is typically attributed to aging. Although age-related rhinitis cannot be reversed, symptomatic treatments do exist. The goal of treatment is to moisten the nasal cavity without creating more nasal dryness in the process, particularly from use of certain antihistamines. 

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