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Review Article

Influence of medications on taste and smell

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Metallic taste

Abstract Medications frequently have chemosensory side effects that can adversely affect compliance with medical treatment regimens. Hundreds of drugs have been reported to induce unpleasant tastes and/or odors as well as altered chemosensations when administered alone or in combination with other medications. Some chemosensory complaints are due to the sensory properties of the drug itself such as aversive bitter and metallic tastes. However, most chemosensory side effects of drugs are due to alterations in the transduction pathways, biochemical targets, enzymes, and transporters by the offending medications. Studies of chemosensory perception in medicated older individuals have found that taste and smell loss is greatest for those consuming the largest number of prescription drugs. There are no standard treatments for drug-induced chemosensory disorders because each drug has unique biological effects. However, there are a few treatment options to ameliorate chemosensory alterations including addition of simulated flavors to food to compensate for losses and to override offending tastes and smells.
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Introduction

In the last 75 years there have been fundamental advancements in the treatment of disease as thousands of new drugs were introduced by the pharmaceutical industry. In the United States, for example, over 1300 new drugs were approved between 1950 and 2013 by the United States Food and Drug Administration.[1] Although most of these drugs have efficacious or even life-saving properties, a significant portion has adverse chemosensory side effects.

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Reviews of clinical reports, drug reference books, medication inserts, and clinical trials have identified over 350 drugs in all major drug categories that elicit taste complaints and over 70 drugs with olfactory effects.[2–6] Fifty percent (50%) of the top 100 drugs of 2017 in the United States have the potential to induce chemosensory complaints and side effects (see Table 1). Functional measurements of chemosensory processes have not yet been performed in systematic well-controlled clinical trials that evaluate the side effects of a wide range of medications so

Table 1 Drugs from top 100 in the United States in 2017[8] that elicit taste or smell complaints or disorders in some individuals.[2–6]

Drug class	Drugs from top 100 in the US in 2017[8]	Taste disorders[2–5]	Smell disorders[6]
Anti-infectives	Amoxicillin	Yes	Yes
	Azithromycin	Yes	Yes
	Ciprofloxacin	Yes	Yes
Anti-inflammatory anti-pyretic and/or analgesic agents	Aspirin	Yes	
	Diclofenac	Yes	
	Ibuprofen	Yes	
	Acetaminophen	Yes	
	Tramadol	Yes	
Antihistamines and antiallergenic agents	Loratadine	Yes	
	Fluticasone	Yes	Yes
	Prednisone		Yes
Antihypertensives and cardiovascular agents	Amlodipine	Yes	Yes
	Diltiazem	Yes	Yes
	Enalapril	Yes	Yes
	Furosemide	Yes	
	Hydrochlorothiazide	Yes	
	Lisinopril	Yes	
	Losartan	Yes	
	Metoprolol	Yes	
	Propranolol	Yes	
	Spironolactone	Yes	
	Triamterene	Yes	
Antilipidemics	Atorvastatin	Yes	Yes
	Lovastatin	Yes	Yes
	Pravastatin	Yes	Yes
	Simvastatin	Yes	
CNS drugs/Sympathomimetics	Amphetamine	Yes	
Endocrine and diabetes drugs	Glipizide	Yes	
	Insulin	Yes	
	Metformin	Yes	
	Levothyroxine	Yes	Yes
Gastrointestinal drugs	Omeprazole	Yes	
	Ranitidine	Yes	
Psychopharmacologic agents	Amitriptyline	Yes	
	Bupropion	Yes	
	Citalopram	Yes	
	Fluoxetine	Yes	
	Paroxetine	Yes	
	Sertraline	Yes	
	Trazodone	Yes	
	Venlafaxine	Yes	
	Alprazolam	Yes	
	Clonazepam	Yes	
	Diazepam	Yes	
	Zolpidem	Yes	
Nose throat and pulmonary agents	Albuterol	Yes	
Vitamins minerals nutrients and related compounds	Ergocalciferol	Yes	
	Potassium	Yes	

CNS: central nervous system.

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