

Drug Treatment of Vertigo

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This pharmacological review is written at a continuing medical education level. An older version of this article can be found in print: (Yacovino and Hain, 2012). We also highly recommend the neuropharmacology review article written by Soto et al (2013).

A discussion of drug treatment should start with a discussion of the neurotransmitters used to signal in the vestibular system. This discussion is [found here](#).

VESTIBULAR SUPPRESSANTS

Vestibular suppressant and antiemetic drugs are the mainstay of treatment of vertigo. The term "vestibular suppressant" is a vague one generally used to indicate drugs that reduce nystagmus evoked by a vestibular imbalance or which reduce motion sickness. Table 1 lists commonly used vestibular suppressants, which consist of three major drug groups, the anticholinergics, the antihistamines, and the benzodiazepines.

Table 1: Vestibular Suppressants (order of preference)				
Drug	Dose	Adverse Reactions	Pharmacologic Class and Precautions	Pregnancy Category
Meclizine (Antivert, Bonine)	25-50 mg q 4-6h	sedating	antihistamine anticholinergic precautions if prostatic enlargement	B
Lorazepam (Ativan)	0.5 mg BID	mildly sedating	benzodiazepine drug dependency	
Clonazepam (Klonopin)	0.5 mg BID	mildly sedating	benzodiazepine drug dependency, long half life.	
Dimenhydrinate (Dramamine)	50 mg q 4-6h	same as Meclizine	antihistamine, anticholinergic	B
Diazepam (Valium)	2 bid PO 5 mg IV (1 dose)	sedating	benzodiazepine drug dependency Precaution in glaucoma. Complex timing.	D
Amitriptyline (Elavil)	10-50 hs	sedating, in overdose cardiac arrhythmia	anticholinergic, tricyclic antidepressant, antihistamine	
Transderm-Scop (hyoscine)	Q3d	dry mouth, dry eyes, urinary retention	anticholinergic	

Doses are all those used routinely for adults, and will generally not be appropriate for children. Pregnancy category varies from A (controlled human studies have failed to demonstrate a risk to the fetus) through D (there is positive evidence of human fetal risk, use only in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective).

Anticholinergics which affect muscarinic receptors, such as scopolamine, increase motion tolerance. The action appears to be mainly central, although there are receptors in both the periphery and centrally. Anticholinergics also affect compensation, producing a reversible overcompensation if administered after compensation has been attained to a vestibular imbalance (Zee, 1988). The mixed antihistamine/anticholinergic drugs are often available OTC, or "over the counter". Examples are meclizine, dimenhydrinate, and diphenhydramine. The antihistamine component has side effects of sleepiness and long term weight gain (see below). Thus it makes some sense to use prescription anticholinergics rather than OTC mixed drugs (such as meclizine). Hyoscyamine, which is the L-isomer of atropine, is a common ingredient in antispasmodic treatments for IBS. Hyoscine, or scopolamine, is mainly used in the patch form to prevent motion sickness.

Agents with central anticholinergic effects are most important in treating vertigo, since anticholinergic drugs that do not cross the blood-brain barrier are ineffective in controlling motion sickness (Takeda et al, 1989). Unlike antihistamines which will be discussed subsequently, pure anticholinergics are ineffective if administered after symptoms have already appeared.

All anticholinergics used in the management of vertigo have prominent side effects of dry mouth, dilated pupils, and sedation. They all make it harder to think as well as acetylcholine is an important neurotransmitter in the brain. Scopolamine and atropine are nonspecific muscarinic receptor antagonists (Barton et al, 1994; Soto et al, 2013). Diphenidol (Vontrol), is also an anticholinergic, although little used in the US. There are also some reports of scopolamine inducing migraine, as well as a withdrawal syndrome. There is no reason to believe that any one nonselective ACH antagonist (e.g. scopolamine) is better than any other ACH antagonist (e.g. meclizine, hyoscyamine, and many other antihistamines), but scopolamine has no central antihistamine component (which is associated with sleepiness and weight gain). Oral versions of scopolamine would seem equally likely to work as patches (e.g. oral drugs for IBS) for [motion sickness](#), but there currently is no oral version of scopolamine (hyoscine). The atrophine derivative, hyoscyamine (L-atropine), can be used instead.

Cholinergic agonists that cross into the brain, such as physostigmine, can cause a [motion-sickness syndrome](#) (Soto et al, 2013). Cholinergic agonists that do not cross into the brain such as neostigmine, do not produce motion sickness. It is to be hoped that agents selective for [vestibular subtypes of muscarinic receptors](#) will eventually be developed or discovered among our presently available pharmacopoeia, as these agents may provide vestibular suppression with less side effects.

Addiction is possible to the anticholinergics. This has been described for scopolamine (Luetje and Wooten 1996), and other anticholinergics may also have addiction syndromes. Withdrawal has been described from a similar agent to meclizine, diphenhydramine. Overdose is similar to acute psychosis. Hospitalization may then precipitate withdrawal. (Thomas et al, 2009). Addiction to the patch can be managed by withdrawal, sometimes facilitated by use of oral agents containing hyoscyamine.

Antihistamines. While the precise role of [histamine](#) in central vestibular processing is uncertain, there are data indicating that centrally acting antihistamines prevent motion sickness and reduce the severity of its symptoms even if taken after the onset of symptoms (Takeda et al, 1989). All the antihistamines in general use for control of vertigo also have anticholinergic activity. With the possible exception of astemizole (Hismanal) in [Meniere's disease](#) (Turner and Jackson, 1989), antihistamines that do not cross the blood brain barrier, are not used to control vertigo. Unfortunately, astemizole does not appear to be generally useful as it is ineffective in preventing motion sickness (Kohl et al, 1987) and because it has significant potential toxicity. There is evidence for involvement of several types of histamine receptors. Serafin and others (1993) reported that histamine increases firing in MVN cells, mediated through the H2 receptor. H1 receptors are present in guinea pig vestibular nucleus, but they don't seem to be relevant to vertigo, and it does not appear that the therapeutic effects of H1 receptor blockers can be attributed to blockate of H1 (Timmerman, 1994). H3 receptor agonists appear to cause the same result as blockade of H2 receptors. Most antihistamines also have [calcium channel blocking effect](#) (according to Timmerman, 1994).

Histamine agonists that act on receptor subtypes are also used for treatment of vertigo (e.g. [betahistine](#)). This can sometimes result in a peculiar situation where individuals take both antihistamines and histamine agonists at the same time. When this is done, it would seem most logical to use a peripherally acting antihistamine that does not cross the blood brain barrier, with the hope that the central action will dominate. While in theory, one might attempt to avoid central antihistamine side effects (e.g. drowsiness, weight gain), by combining a mixed anticholinergic/antihistamine such as meclizine with betahistine, we do not know of any evidence one way or the other. We would guess that it does not work.

Drug	Lowest effective dose	Time constant in the blood	"Low dose" to manage chronic vertigo
Lorazepam	0.5	12-18 hours.	0.5 mg twice/day
Clonazepam	0.5	30 hours	0.5 mg twice/day
Diazepam	2 mg	several, up to 24 hours.	2 mg twice/day
Alprazolam	0.25 mg	8 hours (6-12-15)	Not recommended

Chlordiazepate	7.5 mg	10-30 hours	Not recommended
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Table 2 -- Activity and Time constant of common benzodiazepines

Benzodiazepines are [GABA modulators](#), acting centrally to suppress vestibular responses. [See this page for a longer discussion.](#) They increase the affinity of chloride channel opening (Soto et al, 2013). There are differential effects across benzodiazepines on Gaba-A receptor subtypes. In small doses, these drugs are extremely useful. Addiction, impaired memory, increased risk of falling, and possibly impaired vestibular compensation are their main shortcomings.

Lorazepam and klonazepam are particularly useful agents because of their effectiveness and simple kinetics. Addiction, the biggest problem, can usually be avoided by keeping the dose to 0.5 mg BID or less. Note that lorazepam and klonazepam have quite different time constants (i.e. durations of action), with lorazepam being shorter, which makes for some interesting trade-offs. Other problems with benzodiazepines include higher incidence of car accidents (risk x1.5), and hip fractures (risk x 1.8) (Ray, Griffin et al. 1987; Ray, Fought et al. 1992). Fall risk is increased in the elderly by roughly the same proportions.

Similarly, low doses of diazepam (Valium) (2 mg) can be quite effective for dizziness. Clonazepam (Klonopin), is as effective a vestibular suppressant as lorazepam (Ganaca et al, 2002). The author prefers to avoid use of alprazolam (Xanax) for vestibular suppression, because of the potential for a difficult withdrawal syndrome. Long acting benzodiazepines are not helpful for relief of vertigo.

Antiemetics (see also [emesis page](#))

Table 2 lists the drugs that are commonly used for control of nausea in vertiginous patients. Relatively new are the 5HT3 agents (Zofran, Kytril). In theory, these agents might not be ideal for emesis related to vestibular imbalance. The choice of agent depends mainly on considerations of the route of administration and the side effect profile. The oral agents are used for mild nausea. Suppositories are commonly used in outpatients who are unable to absorb oral agents because of gastric atony or vomiting. Injectables are used in the emergency room or inpatient settings. The new agents are used when all else fails.

Some antihistamines commonly used as vestibular suppressants have significant antiemetic properties (e.g. meclizine). When an oral agent is appropriate, this agent is generally the first to be used, because it rarely causes adverse effects any more severe than drowsiness. Phenothiazines, such as prochlorperazine (Compazine) and promethazine (Phenergan), are effective antiemetics, probably because of their dopamine blocking activity, but they also act at other sites. For example, promethazine is also an H1 blocker. Because these drugs can induce significant side effects, such as dystonia, they are considered second-line drugs whose use should be brief and cautious.

<u>Drug</u>	<u>Usual Dose (Adults)</u>	<u>Adverse Reactions</u>	<u>Pharmacologic Class</u>	<u>Pregnancy Category</u>
domperidone (Motilium)	10 TID	Not approved by FDA	Dopamine blocker	
granisetron (Kytril)	1 mg PO BID 10 ug/kg IV daily	headache sedation	5HT3 antagonist	
meclizine (Antivert, Bonine)	12.5-25 mg q4-6h PO	sedating Precautions in glaucoma, prostate enlargement	antihistamine anticholinergic	B
metoclopramide (Reglan)	10 mg PO TID or 10 mg IM	restlessness or drowsiness extrapyramidal	dopamine blocker stimulates upper gastrointestinal motility	B
ondansetron (Zofran)	4-8 mg PO TID 32 mg IV one dose	precaution in hepatic dysfunction	5HT3 antagonist	B

perphenazine (Trilafon)	2 - 4 mg PO, up to QID or 5mg IM, up to TID	sedating extrapyramidal	phenothiazine (i.e. dopamine blocker)	
prochlorperazine (Compazine)	5 mg or 10 mg IM or PO q6-8 hr. 25 rectal q12h	sedating extrapyramidal	phenothiazine (i.e. dopamine blocker)	C
promethazine (Phenergan)	12.5 mg PO q6-8h or 12.5 mg IM q 6-8h	sedating extrapyramidal	phenothiazine (i.e. dopamine blocker)	
trimethobenzamide (Tigan)	200 mg IM TID	extrapyramidal sedating	similar to phenothiazine (dopamine blocker)	
thiethylperazine (Torecan)	10 mg PO, up to TID or 2 ml IM, up to TID	sedating extrapyramidal	phenothiazine (dopamine blocker)	

Doses are all those used routinely for adults, and will generally not be appropriate for children. Pregnancy category varies from A (controlled human studies have failed to demonstrate a risk to the fetus) through D (there is positive evidence of human fetal risk, use only in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective).

Drugs that speed gastric emptying, such as metoclopramide (Reglan) and powdered ginger root may be helpful in managing emesis (Grontved et al, 1988). Metoclopramide, a dopamine antagonist and a potent central antiemetic, is ineffective in preventing motion sickness (Kohl, 1987). Domperidone (Motilium) is an antiemetic that does not cross the blood brain barrier and thus has less side effects. Although droperidol has been used in the past, it is no longer recommended.

There is a possible role for new antiemetics which are a 5-HT₃ antagonists (ondansetron, Zofran; granisetron, Kytril) used in treating the nausea associated with chemotherapy and post-operative nausea and vomiting. The high cost of these agents presently limits their usefulness in the treatment of vertigo, but they are reasonable agents to try in situations where the more usual agents are ineffective or contraindicated. These agents do not appear to be helpful in preventing motion sickness (Stott et al, 1989). In theory, these agents might be less effective for vestibular elicited emesis than agents with other pharmacologic actions.

Agents used in treating dizziness whose whose role is presently uncertain.

Antidepressants.

Mechanisms of effect of antidepressants for dizziness

- Anticholinergic (such as amitriptyline and nortriptyline)
- Antimigraine (such as amitriptyline, nortriptyline or venlafaxine)
- Antidepressant (improved well being)
- Anti-anxiety

All antidepressants increase ataxia and many cause nausea as well as hypotension. Thus one would think that their role would be limited. However, the ability of antidepressants to manage the psychological fallout from dizziness is often helpful (Horii, Mitani et al. 2004) Horii, A., K. Mitani, et al. (2004). Some antidepressants such as amitriptyline have strong anticholinergic properties which can be of use in managing dizziness. There are several reports of a positive effect, lacking an explanation (e.g. Grubb et al, 1996)

Calcium channel blockers are the most promising agents in this group. More detail about these drugs can be found [here](#).

[Calcium channel blockers](#), such as flunarizine and cinnarizine, are popular antivertiginous agents outside of the U.S. (Rascol et al, 1989). Flunarizine however is also a dopamine blocker, and cinnarizine an antihistamine. Some calcium channel blockers, such as verapamil, have quite strong constipating effects, which may be helpful in managing diarrhea caused by vestibular imbalance. However, calcium channel blockers often have anticholinergic and/or antihistaminic activity and the relative importance of calcium channel blocking associated activity for vestibular suppression has not been determined (Rascol et al, 1989). Another problem is that almost all antihistamines have calcium-entry blocking capacity and/or calmodulin blocking properties, making it difficult to ascertain the mechanism of action (Timmerman, 1994).

According to Soto et al (2013), Cinnarizine also blocks pressure sensitive potassium channels, which may provide it with a separate mechanism for treatment of hydrops.

Calcium channel blockers may be effective in "vestibular [Menieres](#)", or "benign recurrent vertigo", as persons with this diagnosis have a high prevalence of [migraine](#) (Rassekh and Harker, 1992), for which calcium channel blockers can be very effective. According to Soto et al (2013) the most commonly used calcium channel blockers for vertigo are nimodipine, nitrendipine (long lasting) and verapamil. Other long lasting dihydropyridines such as amlodipine, felodipine, nicardipine and nifedipine are seldom used. The author has found daily verapamil to be helpful in a roughly 1/3 of his patients with classic Menieres, causing amelioration or suppression of attacks as long as a reasonable dose is taken. This use of verapamil for vertigo has not been studied or approved in the US. Nimodipine, however, has recently been reported to be effective as prophylaxis of Menieres. In the US, our experience is that only verapamil is used to any great extent.

Gabapentin is also a calcium channel blocker (it is not a GABA agonist in spite of the name).

Diuretics

Carbonic anhydrase inhibitors such as acetazolamide are commonly used to treat [episodic ataxia](#), and are rarely used for [Meniere's disease](#). Weak carbonic anhydrase inhibitors such as topiramate and zonisamide have some efficacy in [migraine](#). Most of these are sulfonamides.

A *potassium channel blocker*, 3-4 DAP (diaminopyridine) as well as its close relative, 4AP, [has been reported useful for persons with ataxia and downbeating nystagmus](#).

This drug is sometimes used for fatigue in MS, as well as for a rare neuromuscular disorder (Eaton Lambert). Side effects include headache, fatigue perioral and/or distal paraesthesia 30-60 minutes after a dose, difficulty in sleeping. Excessive dosage can lead to seizures. The typical starting dose is 10 mg three times/day. 4-AP is a similar agent that has better CNS absorption. We have had no success with this drug at all in treating suitable patients [in our clinical practice](#), and while we continue to be hopeful. Note that the brand-name version of 4AP is priced about 20 times higher than the compounded version of the same chemical.

A *sodium channel blocker*, phenytoin (Dilantin), has also been reported to be protective against [motion sickness](#) (Knox et al, 1994). We have not found this useful.

The author of this review has had no success in limited trials in patients with severe motion sickness unresponsive to the usual agents. Gabapentin (Neurontin), carbamazepine (Tegretol) and oxcarbazepine (Trileptal) are also sometimes successfully used in treatment of vertigo, although their use has not been studied extensively. Gabapentin has also been successfully used to suppress certain types of [central nystagmus](#) (Stahl et al, 1995). As these agents affect GABA, which is important in vertigo, an antivertigo effect is reasonable.

The sodium channel blockers carbamazepine and oxcarbazepine are particularly useful in paroxysmal disorders such as [microvascular compression syndrome](#), and neuritis of the vestibular nerve. They are also occasionally used for tinnitus. Because the both lower serum sodium, they are also sometimes used for treatment of hydrops (i.e. Meniere's disease).

Recent agents have been developed for epilepsy which are glutamate antagonists, but at this writing, they have not been tried as treatments of vertigo.

Another Gaba agonist, Baclofen (Lioresal) has shown some promise in reducing vestibular asymmetry. A human trial indicated that it is not useful in speeding up vestibular compensation (de Valc et al, 2009), but nevertheless this agent may have other uses. GABA would be more likely to slow down compensation. This agent might be suitable for patients with uncompensated vestibular asymmetries. In [our clinical practice](#), we use Baclofen very rarely.

Dopamine blockers for vertigo:

There are a large assortment of dopamine blockers used for emesis. These drugs may also treat migraine (as they are often effective migraine abortive drugs). In fact, Flunarizine is the dominant migraine prevention drug used in Europe. All are limited by their propensity to cause movement disorders (such as drug induced parkinsonism) as well as others. In our view, these drugs should be "last resort" for treatment of chronic vertigo conditions. We are, for example, against the use of Stugerone (cinnarizine) for any chronic dizzy condition. Flunarizine is a close relative to cinnarizine. These drugs are generally considered acceptable for acute use however.

Histamine agonists:

Whereas the antihistamines used in treating vertigo are usually centrally acting histamine H1-receptor antagonists, in some parts of the world an H1+H2-receptor agonist and H3-H4 antagonist, Serc ([betahistine](#)), is used. This is an interesting group that has been poised to move from the uncertain role category to the more conventional category for decades. The main problem with it is that rigorous studies proving efficacy are generally not available, although unrigorous studies abound. According to Timmerman quoting Laurikainen, H1 receptors do not appear to be important at all in vestibular function and the antivertiginous effects of antihistamines are mediated either through non-H1 receptors or other effects of the drugs. Also, the H1 (and H2 effects) are minor. Serc's effects might occur through H2 agonism or H3 antagonism (Timmerman, 1994). H3 is an autoreceptor that modulates H1/H2 as well as potentially other neurotransmitter systems. Recently a 4th histamine receptor (H4) has been identified. H4 antagonists are reported to suppress rat primary vestibular neuron firing (Desmadryl et al, 2012). Also, according to these authors, betahistine does not have a significant effect on the H4 receptor in conventional doses. This may account for the recent suggestions to push the dose up to very high levels (e.g. Strupp et al, 2008).

In the rat brainstem, betahistine produces a slight excitatory response in MVN neurons, and it reduces the excitatory effect of histamine (Soto et al, 2013).

Pragmatically, a [betahistine dose](#) of 16 mg twice to three times/day is usually prescribed, although greater effect is obtained for doses as high as 48 mg (Strupp, et al. 2008). The rationale for this use is that betahistine is said to increase circulation to the inner ear (Halmagyi, 1992) or affect vestibular function through activity of H3 or H4 receptors (Kingma et al, 1997; Timmerman, 1994; Desmadryl et al, 2012). It is difficult to see why vasodilation should improve vertigo, as vasodilation/constriction are side effects of many medications that have no effect at all on vertigo (e.g isorbide). At this writing, as H2 agonism would be stimulatory, it appears most likely that Serc acts through the H3 or H4 receptor.

Serc is approved by the FDA in the US but only if dispensed through compounding pharmacies. It was categorized, in essence, as a harmless substance. Histamine is sometimes prescribed as sublingual drops or subcutaneous injections. It is the author's opinion that sublingual or subcutaneous histamine is a placebo as it is rapidly degraded. Nevertheless, in the authors experience, Serc is moderately effective in suppressing symptoms of [Meniere's disease](#), for uncertain reasons. Following the pharmacological discussion above, Serc might be expected to be effective in any peripheral vestibular disorder, not merely Meniere's disease.

Opioids

Opioids often cause constipation, and drugs that cause constipation usually also reduce dizziness. Droperidol (a dopamine blocker) combined with fentanyl (a powerful opiate) was reported to be effective for acute attacks of [Meniere's disease](#) (Soto et al, 2013). Our thought is that these drugs are far too dangerous to use for this purpose, and that there are much easier ways to stop Meniere's attacks (e.g. lorazepam and ondansetron together).

[Steroids for vestibular disorders.](#)

Corticosteroids such as decadron have been advocated both for treatment of [Meniere's disease](#) and [Vestibular neuritis](#), in both cases, in an attempt to reduce the duration of a vertiginous episode. They are also commonly used for [sudden hearing loss](#). Data concerning efficacy for dizziness is presently conflicted (see [here for a review of data](#)). There are many possible mechanisms of efficacy -- modulation of compensation (Cameron et al, 1999), reduction of immune responses in the inner ear (see [here](#)), reduction of swelling of the vestibular nerve (Strupp et al, 2004), reduction of emesis (Wattwil et al, 2003), increased activity promoting better recovery through a general effect on the sensation of wellbeing. ([See here for the references](#)).

Steroids are commonly used to treat acute flareups of Meniere's disease. The author will occasionally use a few day course of decadron (4 mg qd) or a medrol dose pack, when faced with a severe and unremitting vertigo attributed to Menieres disease. The author routinely uses steroids in [acute vestibular neuritis](#), when there is no serious coincident medical disorder (such as diabetes). All steroids are pregnancy category C, but they are generally felt to be safe during the third trimester.

More about [oral steroids can be found here](#), and [steroids injected through the ear drum, here](#).

Sympathomimetics.

These drugs increase [norepinephrine](#). Examples include ephedrine and the amphetamines. Sympathomimetics may increase alertness and thereby counterbalance the sedative effects of vestibular suppressants. Sympathomimetics also may increase compensation. However, if used for this purpose, the combination of a vestibular suppressant with a drug targeted to increase compensation seems somewhat illogical. Amphetamines are little used because of their addiction potential. Sympathomimetics are generally pregnancy category C.

Dopamine agonists reduce firing rate in the frog hair cells and also reduces response to glutamine (the excitatory transmitter) (Soto et al, 2013). On the other hand, dopamine antagonists are uncommonly used to treat vertigo (e.g. Droperidol, phenothiazines), suggesting that the net effect is against using dopamine agonists.

Acetyl-leucine.

This medication is marketed and largely used in France (Rascol et al, 1995). It is claimed to exert a rapid antivertiginous effect when administered intravenously in humans and also to act as a vestibular suppressant. It is not used in the US for vertigo. The evidence for it working is not the best.

Ginkgo Biloba.

This extract is widely used in France, but its efficacy is in question (Rascol et al, 1995). It has been reported to suppress vertigo and to enhance vestibular compensation in animals. See [here](#) for more information.

Selective ACH antagonists.

The ACH receptor has numerous subtypes, and it would seem reasonable that a selective antagonist to the M2 receptor might cause vestibular suppression without many of the untoward side effects of the more general anti-ACH agents. Unfortunately, little research has been pursued in this direction at the present time.

Alternative medicine agents.

Cocculus is advocated for the temporary relief of lightheadedness. For-HEEL and Vertigo-HEEL is also suggested for vertigo. [NAC](#) is also sometimes recommended for hearing disorders. See [here](#) for more about these agents.

N-acetyl Cysteine (NAC) is another agent suggested for dizziness or tinnitus. [See this page.](#)

Various individual agents, best avoided.

Varenicline (Chantix).

This drug, approved by the FDA for smoking cessation, has recently been reported useful for treatment of cerebellar ataxia (Zesiewicz et al, 2009). It is extremely surprising to find an agent that will ameliorate disorders caused by genetic damage to neurons. It is also disturbing that the number of individuals in the trial (7) was exactly the same as the number of authors on the study. In other words, it would seem to us that if this drug was effective, the number of subjects should be larger as patients with cerebellar disorders are common. We are frankly very dubious. We have never encountered a patient who responded to this medication (who wasn't attempting to stop smoking).

Trimetazidine

This drug is a medication developed for angina (cardiac disturbance). It has been reported useful in diverse disorders (Soto et al, 2013), including Meniere's disease. The evidence for this drug working is presently weak. For example, it is reported to be "as effective" as [betahistine](#). Trimetazidine can also induce a myriad of CNS disorders, largely similar to those produced by [dopamine antagonists](#) (i.e. similar to haloperidol -- Haldol).

Glutamate drugs:

Memantine

This drug is mainly a [glutamate blocker](#) (NMDA), and thus might be a vestibular suppressant. It was approved in the US for prevention of progression of Alzheimer's disease. It also is reported to act on 5HT3, D2, and various cholinergic receptors (Soto et al, 2013). We have never encountered a dizzy patient who responded to memantine. We have also never encountered a patient whose pendular nystagmus responded to memantine. This is hardly surprising as it is a low-affinitive NMDA antagonist. A similar drug is caroverine, that is a glutamate AMPA receptor antagonist.

Hallucinogenic NMDA drugs (antagonists)

These include MK-01, phencyclidine (PCP, "angel dust"), and ketamine ("special K") among others. Of course, side effects and abuse are a problem. Ketamine produces a general "lack of responsive awareness", as well as dizziness (Soto et al, 2013).

REFERENCES

- Ahn, S. K. and C. D. Balaban (2010). "Distribution of 5-HT1B and 5-HT1D receptors in the inner ear." Brain Res 1346: 92-101.
- Anbro BT, Scheid SC, Pribitkin EA. Prescribing guidelines for ENT medications during pregnancy. ENT Journal, 82:8, 565-568, 2003
- Barton JS, Huaman AG, Sharpe JA. Muscarinic antagonists in the treatment of acquired pendular and downbeat nystagmus: a double-blind, randomized trial of three intravenous drugs. Ann Neurol 1994;35:319-325
- Bernstein, P., B. F. McCabe, et al. (1974). "The effect of diazepam on vestibular compensation." The Laryngoscope 84(2): 267-272.
- Cohen B, Helwig D, Raphan T. Baclofen and velocity storage: a model of the effects of the drug on the vestibulo-ocular reflex in the Rhesus monkey. J Physiol (London) 393:703-726, 1987

- De Valck, C. F., L. Vereeck, et al. (2009). "Failure of gamma-aminobutyrate acid-beta agonist baclofen to improve balance, gait, and postural control after vestibular schwannoma resection." *Otol Neurotol* **30**(3): 350-5.
- Desmadril G et al. Histamine H4 receptor antagonists as potent modulators of mammalian vestibular primary neuron excitability. *Br J Pharmacol* 2012;167(4) 905-16
- Ganaca MM et al. Clonazepam in the pharmacological treatment of vertigo and tinnitus. *International Tinnitus Journal*, 8, 1,50-53 (2002)
- Grontved A, Brask T, Kambskard J, Hentzer E. Ginger root against seasickness. *Acta Otol (Stock)* 105:45-49, 1988
- Grubb BP and others. Preliminary observations on the utility of serotonin reuptake inhibitors in the treatment of recurrent severe idiopathic dizziness. *J. Serotonin Res* 1996,1, 43-48
- Halmagyi GM. Vertigo and vestibular disorders. in (Eadie JM, Ed) *Drug Therapy in Neurology*. Churchill Livingstone, Edinburgh, 1992, p383
- "Paroxetine, a Selective Serotonin Reuptake Inhibitor, Reduces Depressive Symptoms and Subjective Handicaps in Patients with Dizziness." *Otol Neurotol* 25(4): 536-543.
- Kingma H, Bonink M, Meulenbroeks A, Konijnenberg H. Dose-dependent effect of betahistine on the vestibulo-ocular reflex: a double-blind placebo controlled study in patients with paroxysmal vertigo. *Acta Otolaryngologica* 117(5):641-6, 1997
- Kohl RL, Homic JL, Cintron N, Calkins DS. Lack of effects of astemizole on vestibular ocular reflex, motion sickness, and cognitive performance in man. *Aviat Space Environ Med* 48: 1171-1174, 1987
- Kohl RL. Failure of metoclopramide to control emesis or nausea due to stressful angular or linear acceleration. *Aviat Space Environ Med* 58: 125-131, 1987
- Knox GW, Woodard D, Chelen W, Ferguson R, Johnson L. Phenytoin for motion sickness: clinical evaluation. *Laryngoscope* 104: 935-939, 1994
- Laurikainen EA et al. 1994, quoted in Timmerman, 1994 (see below).
- Luetje, C. M. and J. Wooten (1996). "Clinical manifestations of transdermal scopolamine addiction." *Ear Nose Throat J* 75(4): 210-4.
- Petrosini L, Dell'Anna ME. Vestibular compensation is affected by treatment with dopamine active agents. *Archives Italiennes de Biologie*. 131(2-3):159-71, 1993
- Pizzi M, Ribola M, Valerio A, Memo M, Spano P. Various Ca²⁺ entry blockers prevent glutamate-induced neurotoxicity. *eur J. Pharm* 209:169-73, 1991
- Prigioni I, Masetto S, Russo G, Taglietti I. Calcium currents in solitary hair cells isolated from frog crista ampullaris. *J. Vest Res*, 2, 31-39, 1992
- Rascol O, Clanet M, Montastruc JL. Calcium antagonists and the vestibular system: a critical review of flunarizine as an antivertigo drug. *Fundam Clin Pharmacol*, 3, 1989, 79s-87s
- Rascol O, Hain TC, Brefel C, Benazet M, Clanet M, Montastruc J. Antivertigo medications and drug-induced vertigo. *A Pharmacological Review*. *Drug* 50 (5) 777-791, 1995
- Rassekh CH, Harker LA, The prevalence of migraine in Meniere's disease. *Laryngoscope* 102: 135-138, 1992
- Ray WA, RL Fought and MD Decker (1992). "Psychoactive drugs and the risk of injurious motor vehicle crashes in elderly drivers." *Am J Epidemiol* 136(7): 873-83.
- Ray WA, MR Griffin, W Schaffner, DK Baugh and LJ Melton, 3rd (1987). "Psychotropic drug use and the risk of hip fracture." *N Engl J Med* 316(7): 363-9.
- Serafin M, Khateb A, Waele Cd, Vidal PP, Muhlthaler M. In vitro properties of medial vestibular neurones. In: *Vestibular and brain stem control of head and body movement* (Ed. H Shimazu and Y. Shinoda), Karger, 111-121, 1992
- Smith PF, Darlington CL. Can vestibular compensation be enhanced by drug treatment ? A review of recent evidence. *J. Vest Res* 4, 169-179, 1994
- Smith, P. F., et al. (2006). "The endocannabinoid system: A new player in the neurochemical control of vestibular function?" *Audiol Neurootol* 11(4): 207-212.
- Smith PF, Darlington CL. A possible explanation for dizziness following SSRI discontinuation. *Acta Oto-laryngologica*, 2010.
- Soto E, Vega R, Emmanuel S. Neuropharmacological basis of vestibular system disorder treatment. *J. Vest Res* 23 119-137, 2013
- Spencer RF, Wang SF, Baker R. The pathways and functions of GABA in the oculomotor system. *Progress in Brain Res* 90:307-331, 1992
- Stahl JS, Rottach KG, Averbuch-Heller L, Maydell RD, Collins SD, Leigh RJ. A pilot study of gabapentin as treatment for acquired nystagmus. *Neuro-ophthalmology* 1996, 16, 107-113
- Stott JRR, Barnes GR, Wright RJ, Ruddock JS. The effect on motion sickness and oculomotor function of GR 38032F, a 5-HT₃ antagonist with anti-emetic properties. *Br J Clin Pharmacol*, 27, 147-157. 1989
- Strupp, M., D. Hupert, et al. (2008). "Long-term prophylactic treatment of attacks of vertigo in Meniere's disease--comparison of a high with a low dosage of betahistine in an open trial." *Acta Otolaryngol* **128**(5): 520-4.
- Takeda N, Mashahiro M, Hasegawa S, Kubo T, Matsunaga T. Neurochemical mechanisms of motion sickness. *Am J Otolaryngol* 10: 351-359, 1989
- Thomas A, et al. Diphenhydramine abuse and withdrawal from use of the drug. *J. Psychopharmacol* 2009;23:101-105.
- Timmerman H. Pharmacotherapy of vertigo: Any news to be expected ? *Acta Otolaryngol (Stockh)* 1994:Suppl 513:28-32
- Torok N. Old and new in Meniere's disease. *Laryngoscope* 87:1870-1877, 1977
- Turner J.S., Jackson R.T. Astemizole use in Meniere's patients with intractable vertigo. In: J. B. Nadol Jr (Ed) *Second international symposium on Meniere's disease*. Amsterdam, Kugler & Ghendi, 1989; 427-432
- Wood CD. Antimotion sickness and antiemetic drugs. *Drugs* 17:471-479, 1979
- Zee DS. The management of patients with vestibular disorders. In: HO Barber, JA Sharpe (eds). *Vestibular disorders*. Yearbook Med. Pub, Chicago, 254-274

- Zeiseiwicz T and others. Treatment of spinocerebellar ataxia and fragile X associated tremor ataxia syndrome (FXTAS) with varenicline (Chantx): Results of a retrospective, blinded video analysis. Neurology 72: 2009, Suppl3, P01.142 (poster abstract).

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