



CLINICAL GUIDELINE

Myasthenia Gravis or Lambert-Eaton Myasthenia Syndrome, Medicines that may affect patients

A guideline is intended to assist healthcare professionals in the choice of disease-specific treatments.

Clinical judgement should be exercised on the applicability of any guideline, influenced by individual patient characteristics. Clinicians should be mindful of the potential for harmful polypharmacy and increased susceptibility to adverse drug reactions in patients with multiple morbidities or frailty.

If, after discussion with the patient or carer, there are good reasons for not following a guideline, it is good practice to record these and communicate them to others involved in the care of the patient.

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Approval Group:	Medicines Utilisation Subcommittee of ADTC

Important Note:

The Intranet version of this document is the only version that is maintained. Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

Information for healthcare professionals

Medicines that may affect patients with Myasthenia Gravis or Lambert-Eaton Myasthenic Syndrome

There are certain medicines that have been reported to worsen or induce myasthenia gravis (MG), often by increasing muscular weakness, and should be used with caution in patients with this condition. The list of medicines in table 1 has been compiled to assist prescribers in the decision making process when prescribing medicines for patients with myasthenia gravis.

The medicines in this list have been classed according to those which should be:

- ▲ ▲ Absolutely contraindicated
- ▲ Avoided
- Used with caution
- Probably safe with patient monitoring.

This list is not exhaustive, best attempts have been made to identify problematic medicines but it is acknowledged that information may not be complete. If a medicine is not on the list it is not guaranteed that it will be safe in myasthenia gravis, please be vigilant with new medicines where safety in myasthenia gravis may be lacking. It is important that patients and doctors be alert to the early signs of an exacerbation of myasthenia gravis (MG) when a new medicine is commenced, even if it is not on the list or is listed as probably safe.

If further advice is required this can be obtained from the neurology pharmacy team (Tel: 0141 201 2688 or email: neuro.pharmacy@ggc.scot.nhs.uk) or the on call neurology registrar who can be contacted via switchboard.

Table 1: Medicines that may affect patients with Myasthenia Gravis or Lambert Eaton Myasthenic Syndrome

Avoid ▲	Caution ■	Probably Safe ●
Gastrointestinal		
<p>Co-phenotrope ▲</p> <p>Magnesium containing antacids/laxatives ▲</p> <p>Antimuscarinics^(a) ▲ Hyoscine (hydrobromide and butylbromide), dicycloverine</p> <p>Anti-emetics ▲ Cinnarizine, promethazine</p>	<p>H2-receptor antagonists ■</p> <p>Anti-emetics ■ Prochlorperazine, levomepromazine, droperidol</p>	<p>Antimuscarinics Propantheline ● (this is routinely used to counteract the side effects of pyridostigmine)</p>
Cardiovascular		
<p>Anti-arrhythmics^(b) ▲ Procainamide, lidocaine, disopyramide, propafenone, quinidine</p>	<p>Anti-arrhythmics ■ Flecainide, amiodarone, dronedarone</p> <p>Anti-platelets ■ Dipyridamole (may counteract the effect of pyridostigmine)</p> <p>Beta-blockers^(a) ■ (class effect including ophthalmic preparations)</p> <p>Calcium Channel Blockers ■ Amlodipine, diltiazem, felodipine, nifedipine, verapamil</p> <p>Diuretics ■ (class effect, monitor electrolytes)</p> <p>Methyldopa ■</p> <p>Statins ■ (class effect)</p>	
Respiratory		
<p>Sedating antihistamines ▲ Alimemazine, clemastine, chlorphenamine, cyproheptadine, hydroxyzine, ketotifen, promethazine</p>	<p>Corticosteroids (inhaled) ■ Caution if high dose, probably safe at lower doses</p>	<p>Antimuscarinics (inhaled) – probably safe due to minimal systemic absorption</p>

Prescribing notes:

- a) Do not stop if stable on treatment – discuss with neurology
- b) If this medicine is clinically indicated and no alternative exists, seek specialist advice
- c) Discuss with neurology if considering use
- d) New onset or exacerbation of myasthenia gravis has been identified as a rare side effect of immune checkpoint inhibitors. See [Cautionary Drugs \(myasthenia.org\)](http://myasthenia.org) for more details
- e) Use may be considered on a case by case basis – discuss with neurology
- f) Small number of case reports of myasthenia gravis in association with hepatitis B vaccination but more evidence needed to determine if causative effect

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Nervous System		
Epilepsy and other seizure disorders		
	Anti-epileptics ■ Carbamazepine, Ethosuximide, Gabapentin, Phenobarbitone, Phenytoin, Thiopental ^(c)	Anti-epileptics ● Levetiracetam, Lamotrigine, Sodium Valproate
Mental health disorders		
Benzodiazepines ▲ (class effect)	Antipsychotics ■ (class effect, includes first and second generation) Buspirone ■ Lithium ■ Monoamine-Oxidase Inhibitors ■ Isocarboxacid, phenelzine, tranylcypromine Tricyclic antidepressants ■ (class effect)	
Movement disorders		
Orphenadrine ▲ Procyclidine ▲ Trihexyphenidyl ▲ Botulinum Toxin ▲	Amantadine ■	
Nausea and labyrinth disorders		
Anti-emetics ▲ Cinnarizine, promethazine	Anti-emetics ■ Prochlorperazine, levomepromazine, droperidol	
Pain		
Strong opioids ▲ (class effect)	Weak opioids ■ (class effect, includes tramadol)	Paracetamol ●
Migraine		
	Pizotifen ■ Eletriptan ■	
Sleep disorders		
Benzodiazepines ▲ (class effect) Zopiclone, Zolpidem ▲ Diphenhydramine (Nyto[®]) ▲	Chloral hydrate ■ Clomethiazole ■ Melatonin ■	
Nicotine dependence		
	Nicotine replacement ■	

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Avoid ▲	Caution ■	Probably Safe ●
Infection		
▲▲ Telithromycin is Absolutely Contraindicated		
<p>Aminoglycosides^(b) ▲ Gentamicin, amikacin, tobramycin, streptomycin, neomycin</p> <p>Antimalarials ▲ Chloroquine, mefloquine, quinine</p> <p>Clindamycin ▲</p> <p>Polymyxins ▲ Colistimethate sodium</p> <p>Ribavirin ▲</p>	<p>Macrolides ■ Clarithromycin, erythromycin, azithromycin</p> <p>Penicillins ■ Ampicillin</p> <p>Quinolones ■ Ciprofloxacin, delafloxacin, levofloxacin, moxifloxacin, norfloxacin, ofloxacin</p> <p>Tetracyclines ■ Doxycycline, lymecycline, minocycline, oxytetracycline, tetracycline, demeclocycline</p> <p>Cefoxitin ■</p> <p>Co-trimoxazole ■ (sulphonamides)</p> <p>Daptomycin ■</p> <p>Imipenem-cilastin ■</p> <p>Nitrofurantoin ■</p> <p>Rifampicin ■</p> <p>Vancomycin ■</p> <p>Ritonavir ■</p>	<p>Aztreonam ●</p> <p>Ceftriaxone ●</p> <p>Meropenem ●</p> <p>Metronidazole ●</p> <p>Penicillins (except ampicillin) ●</p> <p>Trimethoprim ●</p> <p>Aciclovir ●</p>
Endocrine		
<p>Levothyroxine ▲ Avoid over replacement</p>	<p>Corticosteroids ■ (commonly used to treat MG. Sudden increases in dose could exacerbate symptoms – please consult neurology)</p> <p>Bisphosphonates ■</p> <p>Oestrogens/Progestogens ■ Hormonal changes may affect MG symptoms</p>	
Genito-urinary		
<p>Antimuscarinics ■ Darifenacin, fesoterodine, flavoxate, oxybutynin, propiverine solifenacin, tolterodine, trospium</p> <p>(solifenacin may be safest of drug class, please discuss with neurology)</p>	<p>Alpha-adrenoceptor blockers ■ Alfuzosin, doxazosin, indoramin, prazosin, tamsulosin, terazosin</p> <p>Oestrogens/Progestogens ■ Hormonal changes may affect MG symptoms</p>	

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- Discuss with neurology if considering use
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Avoid ▲	Caution ■	Probably Safe ●
Immune system and malignant disease		
Discussion with neurology advised prior to commencing chemotherapy in myasthenic patient		
	<p>Aldesleukin, busulfan, cisplatin, doxorubicin, etoposide, fludarabine, mitotane ■</p> <p>Monoclonal antibodies: ^(d) atezolizumab, avelumab, cemiplimab, durvalumab, ipilimumab, nivolumab, pembrolizumab ■</p> <p>Oestrogens/Progestogens ■ Hormonal changes may affect MG symptoms</p> <p>Interferon (alpha and beta) ■</p> <p>Glatiramer ■</p>	
Blood and Nutrition		
<p>Magnesium supplements ▲ (unless treating hypomagnesaemia)</p>	<p>Desferrioxamine ■</p> <p>Eltrombopag ■</p> <p>Miglustat ■</p> <p>Sodium lactate ■</p> <p>Trientine ■</p>	
Musculoskeletal		
<p>Rheumatology Penicillamine ▲ Hydroxychloroquine ▲</p> <p>Colchicine ▲</p> <p>Muscle Relaxants – dantrolene, methocarbamol ▲</p> <p>Quinine ▲</p>	<p>Collagenase ■</p> <p>Etanercept ■</p> <p>Febuxostat ■</p> <p>Muscle Relaxants ^(c) ■ Baclofen, tizanidine</p> <p>Riluzole ■</p>	<p>Ibuprofen ●</p> <p>Naproxen ●</p>

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Eye		
Polymyxin or bacitracin containing preparations ▲ Aminoglycoside eye drops ▲	Antimuscarinic eye drops ■ atropine, cyclopentolate, tropicamide Beta-blocker eye drops ■ Carbonic anhydrase inhibitors (oral and ophthalmic) ■ Acetazolamide, brinzolamide, dorzolamide Corticosteroid eye drops ■ Local anaesthetic eye drops ■ Macrolide eye drops ■ Quinolone eye drops ■	
Ear, nose and oropharynx		
Polymyxin or bacitracin containing preparations ▲ Aminoglycosides (ear and nose) ▲	Corticosteroids (ear, nose and oropharynx) ■ Lidocaine (oropharynx) ■	
Skin		
Polymyxin or bacitracin containing preparations ▲ Aminoglycosides (topical) ▲	Clindamycin (topical) ■ Corticosteroids (topical) ■ Imiquimod ■ Macrolides (topical) ■	Antimuscarinics (topical) ■
Vaccines		
Yellow fever vaccine ▲^(e) Avoid live vaccines if on immunosuppression ▲	Hepatitis B vaccine^(f) ■	

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Avoid ▲	Caution ■	Probably Safe ●
Anaesthesia		
Discussion with neurology advised prior to myasthenic patient undergoing anaesthesia		
Muscle Relaxants – dantrolene ▲	Inhalational agents ■ myasthenic patients require smaller amounts of these agents Depolarising drugs ■ variable response in myasthenia gravis Non-depolarising drugs ■ myasthenic patients are particularly sensitive to these agents Local anaesthetics ■ myasthenic patients require smaller amounts of these agents Antimuscarinics ■ Atropine, glycopyrronium	Propofol (c) ●
Emergency treatment of poisoning		
	Pralidoxime chloride ■	
Miscellaneous		
	Iodinated Contrast Media ■	

References

The following references have been used to compile this list in conjunction with local expert opinion:

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