



Streptomyces lincolnensis



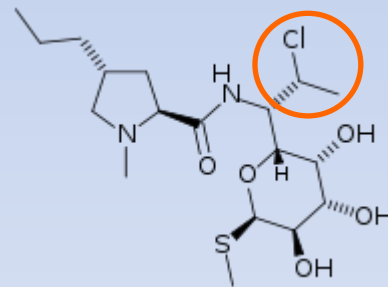
Lincomycin (1963)

7-chlor-7-desoxylincomycin

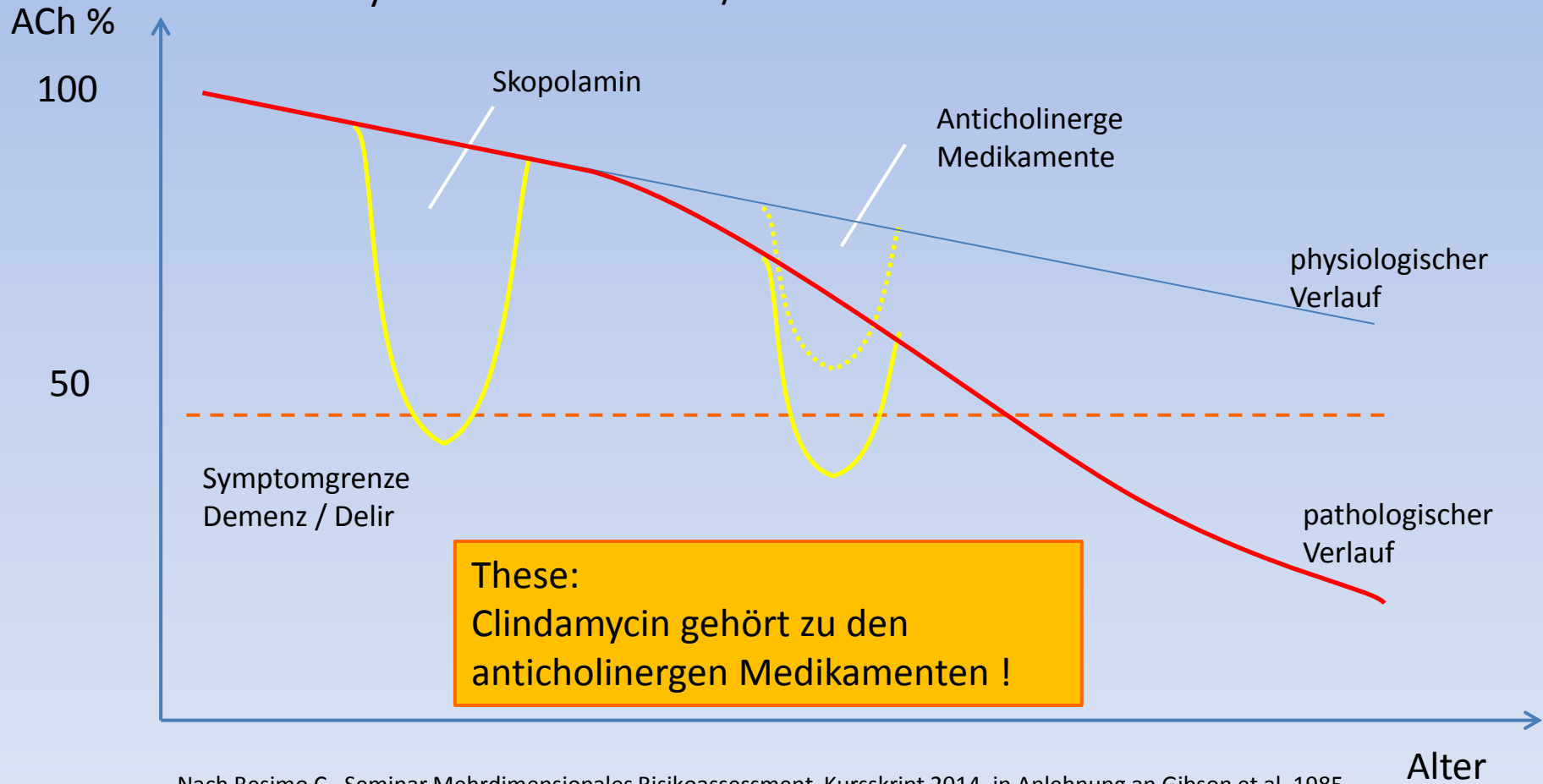
Cl + Lin + mycin

Clindamycin

Lincosamide



Acetylcholin und Demenz / Alzheimer



Nach Besimo C, Seminar Mehrdimensionales Risikoassessment Kursskript 2014, in Anlehnung an Gibson et al. 1985

Verordnung von Antibiotika durch Zahnärzte



2012



2011

Wirkstoff	DDD (Mio)	%
Clindamycin	12,87	40,8
Aminopenicilline	12,13	38,5
Penicilline	3,95	12,5
Doxycyclin	1,20	3,8
Amoxicillin + Clavulansäure	0,72	2,3
Metronidazol	0,34	1,1
Cephalosporine	0,22	0,7
Macrolide	0,11	0,3
	31,54	100,0

Schwabe U Paffrath D Arzneiverordnungsreport 2013 Springer

Table 4.1: Antibacterial Drugs; items and NIC as

Paragraph Name	Items	% of Antibacterial Drug items	Perc
Penicillins	2,595,753	66.0	
Metronidazole and Tinidazole	1,089,447	27.7	
Macrolides	187,207	4.8	
<u>Clindamycin</u>	26,939	0.7	
Cephalosporins and other Betalactams	22,579	0.6	
Tetracyclines	13,773	0.3	
Total	3,935,698	100.0	

Prescribing by Dentists, England – 2011 , The Health and Social Care Information Centre. 2012

In D **58** mal so viel wie in GB

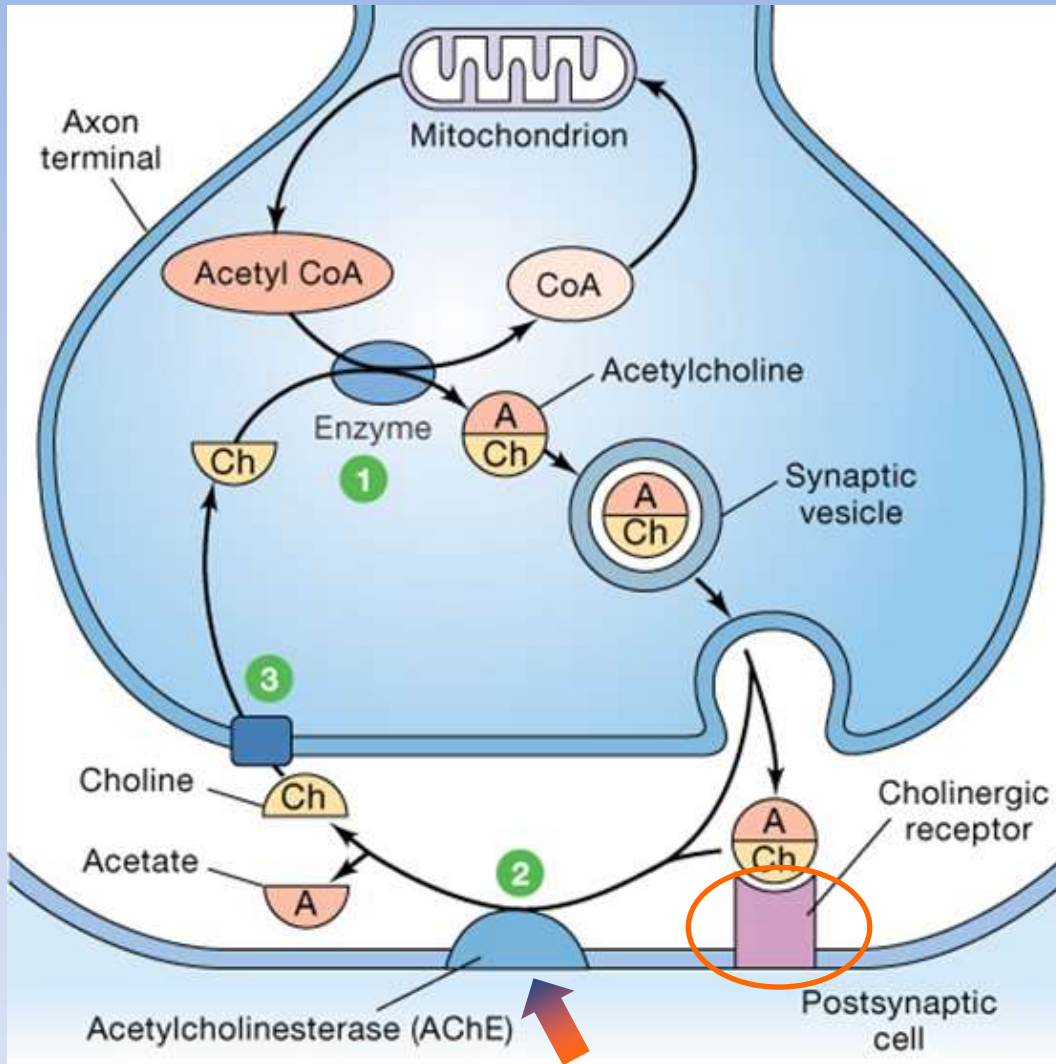


Bild: Pasadena City College

Antidementiva



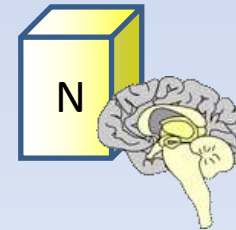
Muskarinische Rezeptoren



„Anticholinerge Wirkung“



Nikotinische Rezeptoren

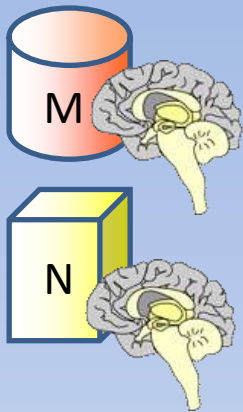


Anticholinerge Wirkung des Clindamycin an motorischen Endplatten

Es ist Vorsicht geboten bei:

- eingeschränkter Leberfunktion
- **Störungen der neuromuskulären Übertragung (Myasthenia gravis, Parkinson-Krankheit)** sowie
- Magen-Darm-Erkrankungen in der Vorgeschichte (z. B. frühere Entzündungen des Dickdarms)

Clindamycin kann aufgrund seiner **neuromuskulär blockierenden Eigenschaften** die Wirkung von Muskelrelaxantien (z. B. Ether, Tubocurarin, Pancuroniumhalogenid) verstärken. Hierdurch können bei Operationen unerwartete **lebensbedrohliche Zwischenfälle** auftreten.



aerzteblatt.de

Anticholinerge Wirkung von Medikamenten

MEDIZIN

Geriatric: Anticholinerge Last als Sterberisiko

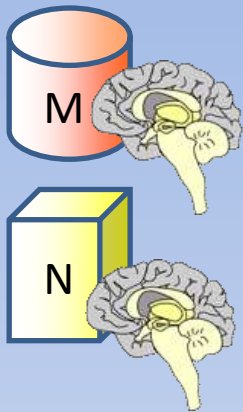
Freitag, 24. Juni 2011

Cambridge – Der häufige Einsatz von Medikamenten mit anticholinergen Eigenschaften birgt bei älteren Patienten erhebliche Risiken. Neben einer Einschränkung der kognitiven Fähigkeiten ermittelt eine Studie des britischen Medical Research Council im Journal of the American Geriatrics Society (2011; doi: 10.1111/j.1532-5415.2011.03491.x) ein deutlich erhöhtes Sterberisiko.



Da ... sich die [anticholinergen] Nebenwirkungen addieren, raten die Autoren den Ärzten dringend, ihre Medikationsempfehlungen regelmäßig auf ihre anticholinergen Last hin zu überprüfen.

Die Bedenken sind im Prinzip nicht neu. Neu ist allerdings die systematische Berechnung der anticholinergen Last.

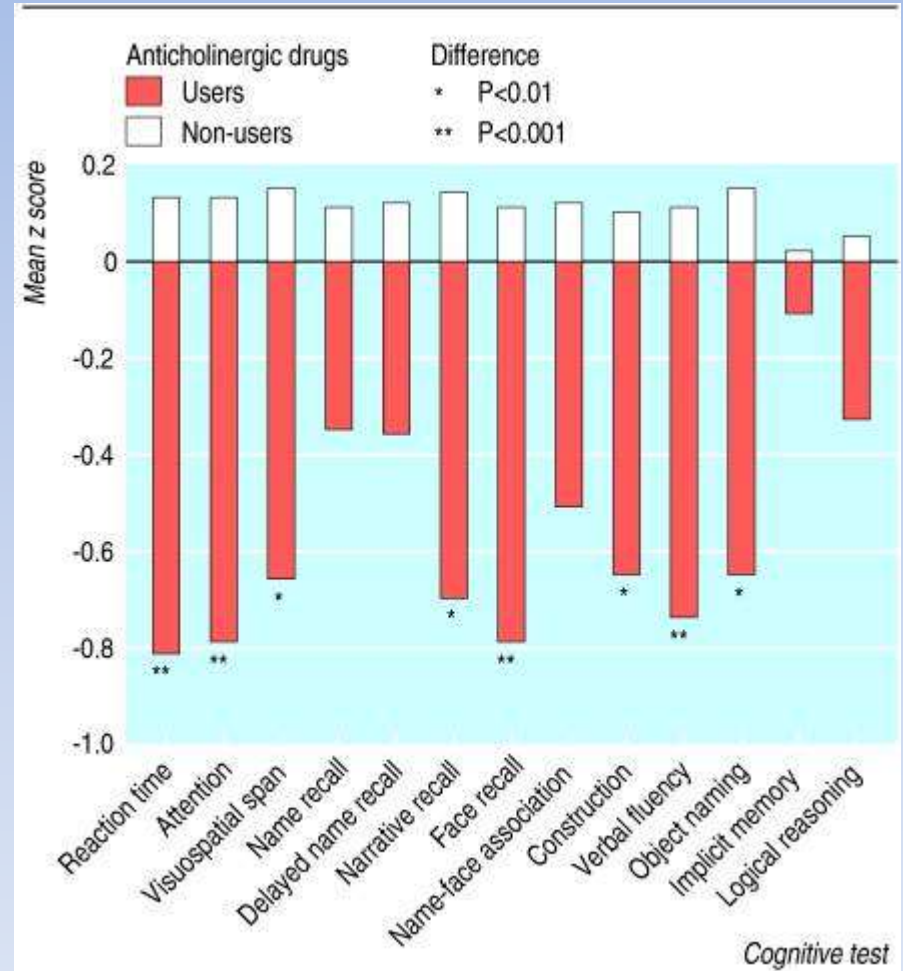


Anticholinerge Wirkung von Medikamenten

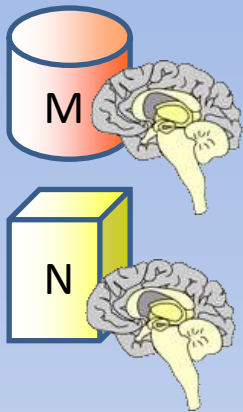
BMJ. Feb 25, 2006; 332(7539): 455–459.
 doi: 10.1136/bmj.38740.439664.DE
 PMID: PMC1382539

Non-degenerative mild cognitive impairment in elderly people and use of anticholinergic drugs: longitudinal cohort study

Marie L Ancelin, senior research fellow,¹ Sylvaine Artero, research fellow,¹ Florence Portet, assistant professor,¹ Anne-Marie Dupuy, assistant professor,¹ Jacques Touchon, professor,¹ and Karen Ritchie, research director¹



Anticholinerge Wirkung von Medikamenten



[J Clin Pharmacol.](#) 2006 Dec;46(12):1481-6.

The Anticholinergic Drug Scale as a measure of drug-related anticholinergic burden: associations with serum anticholinergic activity.

[Carnahan RM](#)¹, [Lund BC](#), [Perry PJ](#), [Pollock BG](#), [Culp KR](#).

[Arch Intern Med.](#) 2007 Apr 23;167(8):781-7.

A drug burden index to define the functional burden of medications in older people.

[Hilmer SN](#)¹, [Mager DE](#), [Simonsick EM](#), [Cao Y](#), [Ling SM](#), [Windham BG](#), [Harris TB](#), [Hanlon JT](#), [Rubin SM](#), [Shorr RI](#), [Bauer DC](#), [Abernethy DR](#).

[Arch Intern Med.](#) 2008 Mar 10;168(5):508-13. doi: 10.1001/archinternmed.2007.106.

The anticholinergic risk scale and anticholinergic adverse effects in older persons.

[Rudolph JL](#)¹, [Salow MJ](#), [Angelini MC](#), [McGlinchey RE](#).

[Aging Health](#)

June 2008, Vol. 4, No. 3, Pages 311-320 , DOI 10.2217/1745509X.4.3.311

(doi:10.2217/1745509X.4.3.311) Review

Impact of anticholinergics on the aging brain: a review and practical application

Malaz Boustani¹⁺, Noll Campbell², Stephanie Munger^{1,3}, Ian Maidment⁴ & Chris Fox⁵

Drugs with ACB Score of 1

Generic Name	Brand Name
Alimemazine	Theralen™
Alverine	Spasmonal™
Alprazolam	Xanax™
Aripiprazole	Abilify™
Asenapine	Saphris™
Atenolol	Tenormin™
Bupropion	Wellbutrin™, Zyban™
Captopril	Capoten™
Cetirizine	Zyrtec™
Chlorthalidone	Diuril™, Hygroton™
Cimetidine	Tagamet™
Clidinium	Librax™
Clorazepate	Tranxene™
Codeine	Contin™
Colchicine	Colcrys™
Desloratadine	Clarinx™
Diazepam	Valium™
Digoxin	Lanoxin™
Dipyridamole	Persantine™
Disopyramide	Norpace™
Fentanyl	Duragesic™, Actiq™
Furosemide	Lasix™
Fluvoxamine	Luvox™
Haloperidol	Haldol™
Hydralazine	Apresoline™
Hydrocortisone	Cortel™, Cortaid™
Iloperidone	Fanapt™
Isosorbide	Isordil™, Ismo™
Levocetirizine	Xyzal™
Loperamide	Immodium™, others
Lorastadine	Clanrin™
Metoprolol	Lopressor™, Toprol™
Morphine	MS Contin™, Avinza™
Nifedipine	Procardia™, Adalat™
Paliperidone	Invega™
Prednisone	Deltasone™, Sterapred™
Quinidine	Quinaglute™
Ranitidine	Zantac™
Risperidone	Risperdal™
Theophylline	Theodur™, Uniphyll™
Trazodone	Desyrel™
Triamterene	Dyrenium™
Venlafaxine	Effexor™
Warfarin	Coumadin™

Drugs with ACB Score of 2

Generic Name	Brand Name
Amantadine	Symmetrel™
Belladonna	Multiple
Carbamazepine	Tegretol™
Cyclobenzaprine	Flexeril™
Cyproheptadine	Periactin™
Loxapine	Loxitane™
Meperidine	Demerol™
Methotrimeprazine	Levoprome™
Molindone	Moban™
Nefopam	Nefogesic™
Oxcarbazepine	Trileptal™
Pimozide	Orap™

Drugs with ACB Score of 3

Generic Name	Brand Name
Amitriptyline	Elavil™
Amoxapine	Asendin™
Atropine	Sal-Tropine™
Benztropine	Cogentin™
Brompheniramine	Dimetapp™
Carbinoxamine	Histex™, Carbihist™
Chlorpheniramine	Chlor-Trimeton™
Chlorpromazine	Thorazine™
Clemastine	Tavist™
Clomipramine	Anafranil™
Clozapine	Clozaril™
Darifenacin	Enablex™
Desipramine	Norpramin™
Dicyclomine	Bentyl™
Dimenhydrinate	Dramamine™, others
Diphenhydramine	Benadryl™, others
Doxepin	Sinequan™
Doxylamine	Unisom™, others
Fesoterodine	Toviaz™
Flavoxate	Urispas™
Hydroxyzine	Atarax™, Vistaril™
Hyoscyamine	Anaspaz™, Levsin™
Imipramine	Tofranil™
Medizine	Antivert™
Methocarbamol	Robaxin™
Nortriptyline	Pamelor™
Olanzapine	Zyprexa™
Orphenadrine	Norflex™
Oxybutynin	Ditropan™
Paroxetine	Paxil™
Perphenazine	Trilafon™
Promethazine	Phenergan™
Propantheline	Pro-Banthine™
Propiverine	Detrunorm™
Quetiapine	Seroquel™
Scopolamine	Transderm Scop™
Solifenacin	Vesicare™
Thioridazine	Mellaril™
Tolterodine	Detrol™
Trifluoperazine	Stelazine™
Trihexyphenidyl	Artane™
Trimipramine	Surmontil™
Tropium	Sanctura™

Categorical Scoring:

- Possible anticholinergics include those listed with a score of 1; Definite anticholinergics include those listed with a score of 2 or 3

Numerical Scoring:

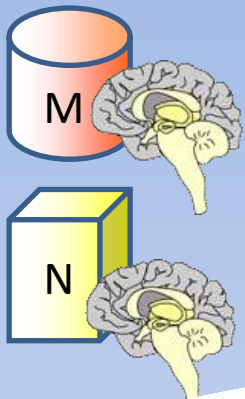
- Add the score contributed to each selected medication in each scoring category
- Add the number of possible or definite Anticholinergic medications

Notes:

- Each definite anticholinergic may increase the risk of cognitive impairment by 46% over 6 years.³
- For each on point increase in the ACB total score, a decline in MMSE score of 0.33 points over 2 years has been suggested.⁴
- Additionally, each one point increase in the ACB total score has been correlated with a 26% increase in the risk of death.⁴

ANTICHOLINERGIC
COGNITIVE BURDEN
SCALE

Anticholinerge Wirkung von Medikamenten



[J Clin Pharmacol](#). 2006 Dec;46(12):1481-6.

The Anticholinergic Drug Scale as a measure of drug-related anticholinergic associations with serum anticholinergic activity.

[Carnahan RM](#)¹, [Lund BC](#), [Perry PJ](#), [Pollock BG](#), [Culp KR](#).

Clindamycin

[J Clin Psychiatry](#). 2001;62 Suppl 21:11-4.

Anticholinergic effects of medication in elderly patients.

[Tune LF](#).

Table 3. Commonly Used Medicines That Have Anticholinergic Effects^a

Antihistamines	Corticosteroids
Diphenhydramine	Corticosterone
Hydroxyzine	Dexamethasone
Cardiovascular	Hydrocortisone
Captopril	Prednisolone
Chlorthalidone	Gastrointestinal
Digoxin	Atropine
Diltiazem	Cimetidine
Dipyridamole	Ranitidine
Furosemide	Immunosuppression
Hydrochlorothiazide	Azathioprine
Hydralazine	Cyclosporin
Isosorbide mononitrate	Infection
Methyldopa	Ampicillin
Nifedipine	Cefalothin
Triamterene	Cefamandole
Warfarin	Cefoxitin
Central nervous system	Clindamycin
Alprazolam	Cycloserine
Amtripyline	Gentamicin
Chlordiazepoxide	Piperacillin
Codeine	Tobramycin
Desipramine	Vancomycin
Diazepam	Muscle relaxants
Doxepin	Pancuronium
Flurazepam	Respiratory system
Imipramine	Theophylline
Oxazepam	
Oxycodone	
Phenelzine	
Phenobarbital	

^aData from Tune et al.¹⁵

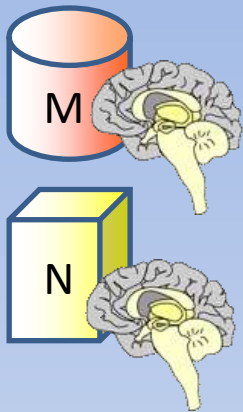
TABLE 1. Anticholinergic Drug Levels in 25 Medications Ranked by the Frequency of Their Prescription for Elderly Patients

Medication ^a	Anticholinergic Drug Level (ng/ml of atropine equivalents)
1. Furosemide	0.22
2. Digoxin	0.25
3. Dyazide	0.08
4. Lanoxin ^b	0.25
5. Hydrochlorothiazide	0.00
6. Propranolol	0.00
7. Salicylic acid	0.00
8. Dipyridamole	0.00
9. Theophylline anhydrous	0.00
10. Nitroglycerin	0.00
11. Insulin	0.00
12. Warfarin	0.11
13. Prednisolone	0.44
14. Alpha-methyldopa	0.00
15. Nifedipine	0.00
16. Isosorbide dinitrate	0.12
17. Ibuprofen	0.55
18. Codeine	0.00
19. Cimetidine	0.22
20. Diltiazem hydrochloride	0.15
21. Captopril	0.00
22. Atenolol	0.11
23. Metoprolol	0.86
24. Timolol	0.00
25. Ranitidine	0.00

^aAt a 10⁻⁸ M concentration.
^bA digoxin compound.

15. Tune L, Carr S, Hoag E, et al. Anticholinergic effects of drugs commonly prescribed for the elderly: potential means for assessing risk of delirium. *Am J Psychiatry* 1992;149:1393-1394

Anticholinerge Wirkung von Medikamenten



[Eur J Clin Pharmacol](#). 2013 Jul;69(7):1485-96. doi: 10.1007/s00228-013-1499-3. Epub 2013 Mar 26.

Systematic review of anticholinergic risk scales in older adults.

[Durán CE](#)¹, [Azermai M](#), [Vander Stichele RH](#).

N	Drug name	ATC 5th level	Carnahan 2006 USA	Ancelin 2006 France	Chew 2008 USA	Rudolph 2008 USA	Han 2008 USA	Ehrt 2010 Norway	Sittironnarit 2011 Australia
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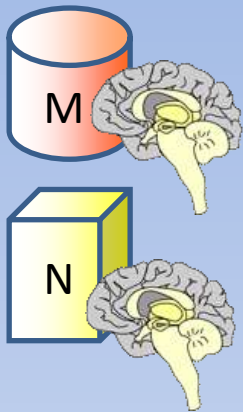
• Sublist 1. Discrepancies in drugs that received low grades, not confirmed in Martindale (improbable anticholinergic action)



15	Cephalotin	J01DB03	1
16	Clindamycin	J01FF01	1
17	Cortisone	H02AB10	1
18	Cycloserine	J04AR01	1



Blut-Hirn Schranke und Clindamycin



Fachinformation:

Clindamycin eignet sich nicht zur Meningitistherapie, da die im Liquor cerebrospinalis erreichbaren Antibiotikakonzentrationen zu gering sind.

[Antimicrob Agents Chemother.](#) 1998 Nov;42(11):3014-7.

Penetration of clindamycin and its metabolite N-demethylclindamycin into cerebrospinal fluid following intravenous infusion of clindamycin phosphate in patients with AIDS.

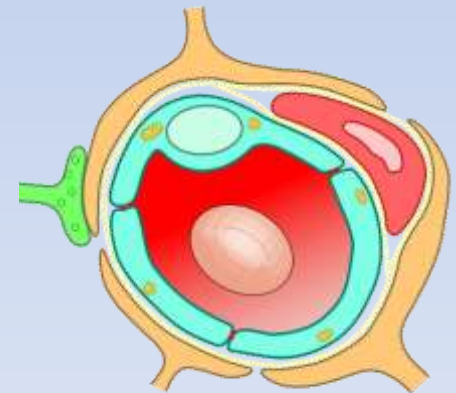
[Gatti G¹](#), [Malena M](#), [Casazza R](#), [Borin M](#), [Bassetti M](#), [Cruciani M](#)

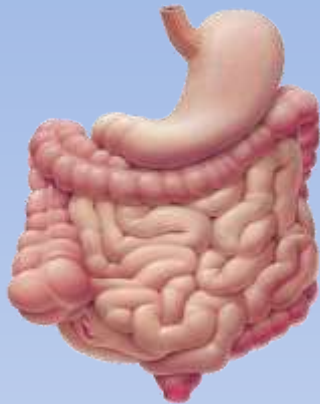
[J Neurosurg.](#) 1975 Dec;43(6):717-20.

Clindamycin concentrations in the central nervous system of primates before and after head trauma.

[Picardi JL](#), [Lewis HP](#), [Tan JS](#), [Phair JP](#).

“...Penetration into brain tissue was erratic and concentrations detected were not significant. Cerebrospinal fluid levels, however, averaged 20.5% of paired serum concentrations and were higher than concentrations needed to inhibit most Gram-positive bacteria...”





Pseudomembranöse Colitis und Clindamycin

Antimicrob Agents Chemother. May 2013; 57(5): 2326–2332.

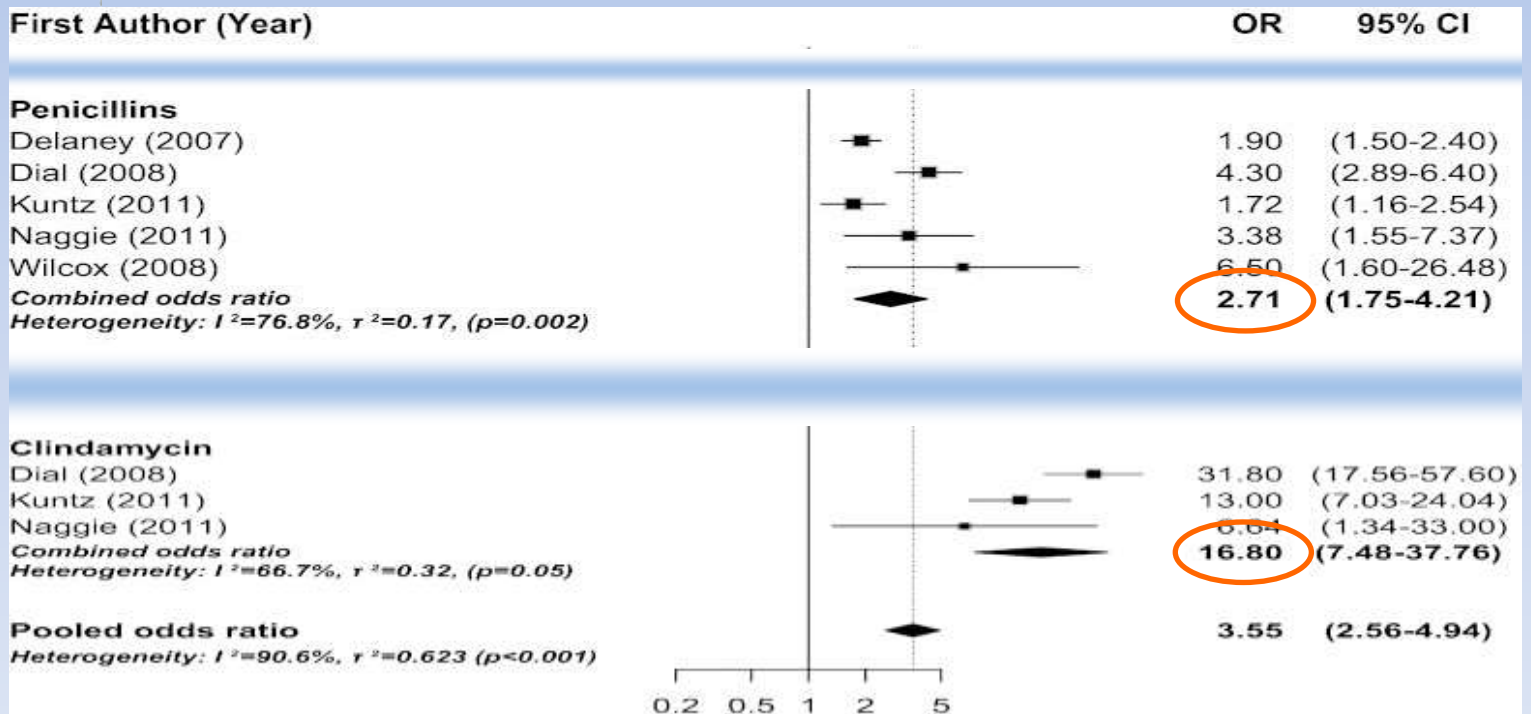
doi: [10.1128/AAC.02176-12](https://doi.org/10.1128/AAC.02176-12)

PMCID: PMC3632900

Meta-Analysis of Antibiotics and the Risk of Community-Associated *Clostridium difficile* Infection

[Kevin A. Brown](#),^a [Nagham Khanafer](#),^b [Nick Daneman](#),^c and [David N. Fisman](#)

6x
!





Pseudomembranöse Colitis und Clindamycin

The rising incidence of *Clostridium difficile* infection (CDI) could be reduced by lowering exposure to high-risk antibiotics...

... Avoidance of high-risk antibiotics (such as clindamycin...) in favor of lower-risk antibiotics (such as penicillins, macrolides, and tetracyclines) may help reduce the incidence of CDI.

[BMC Infect Dis.](#) 2013 Jul 1;13(1):299. [Epub ahead of print]

A unique strain of community-acquired *Clostridium Difficile* in severe complicated infection and death of a young adult.

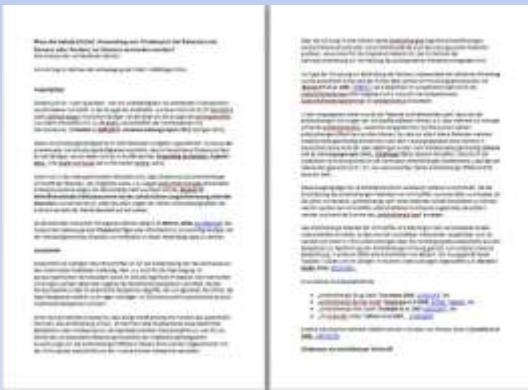
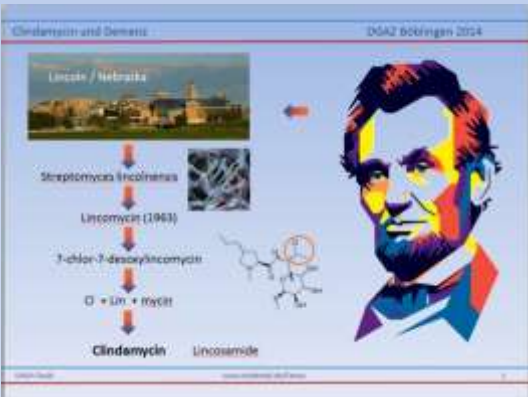
[Heslop OD](#), [Roye-Green K](#), [Coard K](#), [Mulvey MR](#)

Case presentation:

We report a case of a **22-year-old female university student** who was admitted to the University Hospital of the West Indies, Jamaica with a presumptive diagnosis of pseudomembranous colitis PMC.

She presented with a 5-day history of diarrhoea following **clindamycin treatment for coverage of a tooth extraction due to a dental abscess**. Her clinical condition deteriorated and progressed from diarrhoea to toxic megacolon, bowel perforation and Gram-negative sepsis. ***Clostridium difficile* NAP12/ribotype 087** was isolated from her stool while blood cultures grew *Klebsiella pneumoniae*. Despite initial treatment intervention with empiric therapy of metronidazole and antibiotic clearance of *Klebsiella pneumoniae* from the blood, **the patient died within 10 days of hospital admission**

Danke!



www.mizdental.de/extra.html