

$C_{17}H_{23}NO_3$

Atropina belladonna
Deadly nightshade
Nux vomica
Mandrake extract
Jimson Weed

8-methyl-8-azabicyclo-[3.2.1]oct-3-yl)3-hydroxy-2-phenylpropanoate



DOES ATROPINE PREVENT INTUBATION ASSOCIATED BRADYCARDIA?



Randall Wetzel
Hiroshi Sakurai



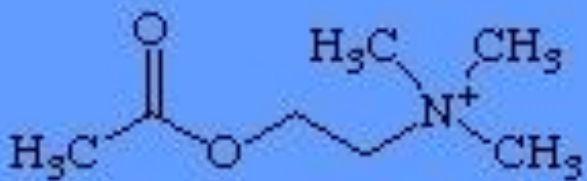
FIGHT ON!



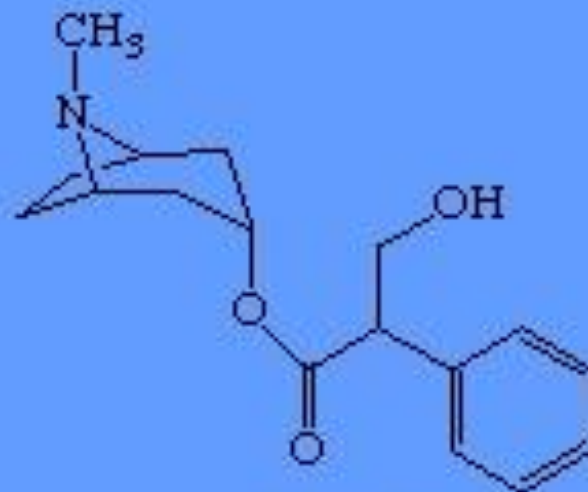
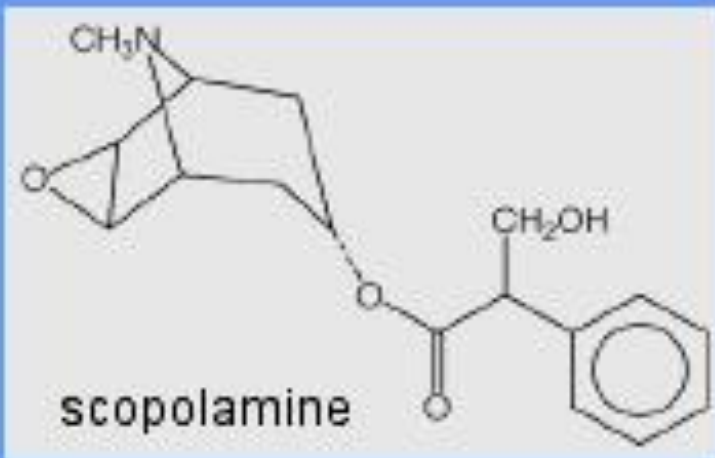
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Acetylcholine - Antagonists



Acetylcholine



Deadly nightshade
(*Atropa belladonna*)

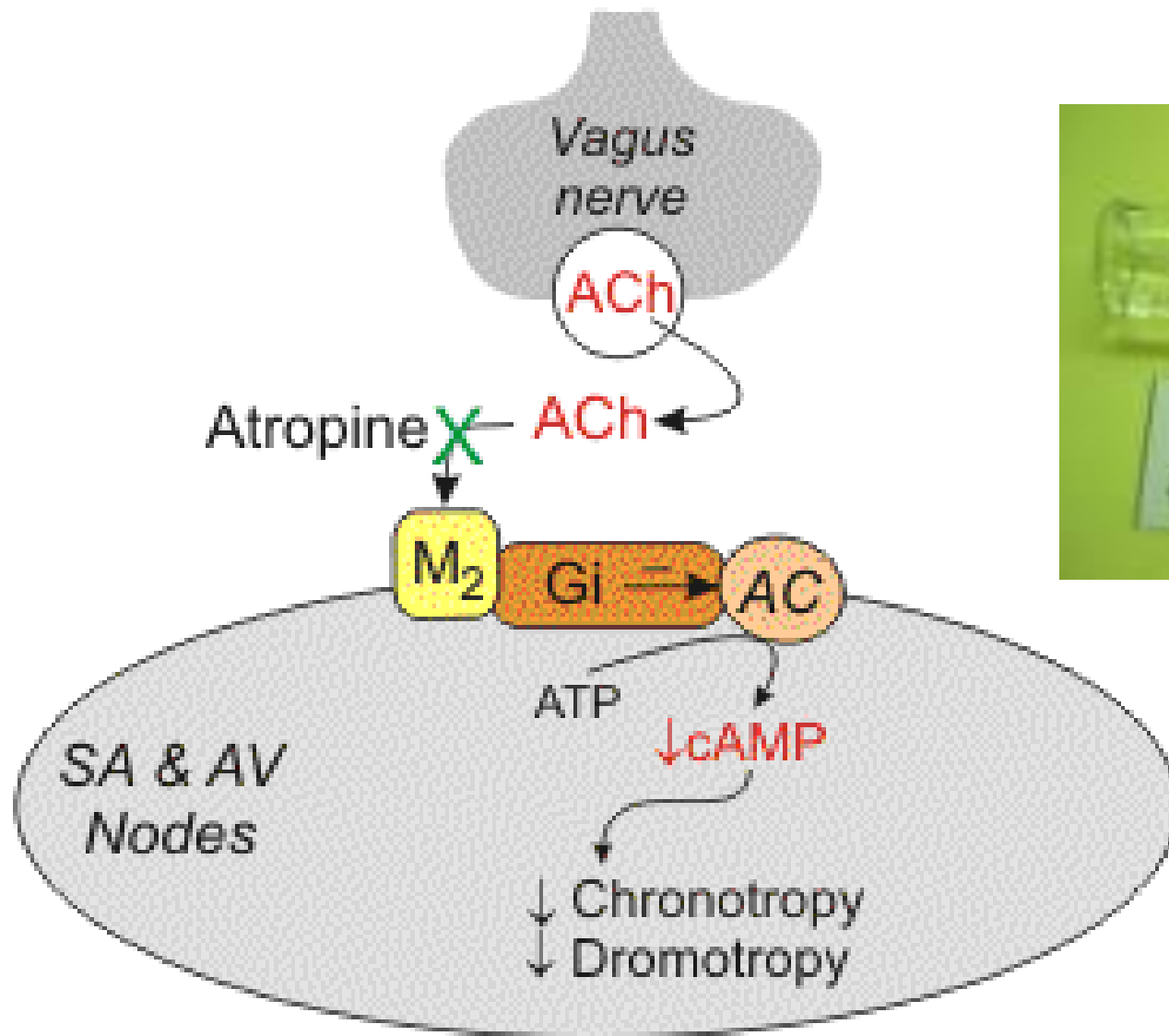
Anti-Sialogogue
vagolytic



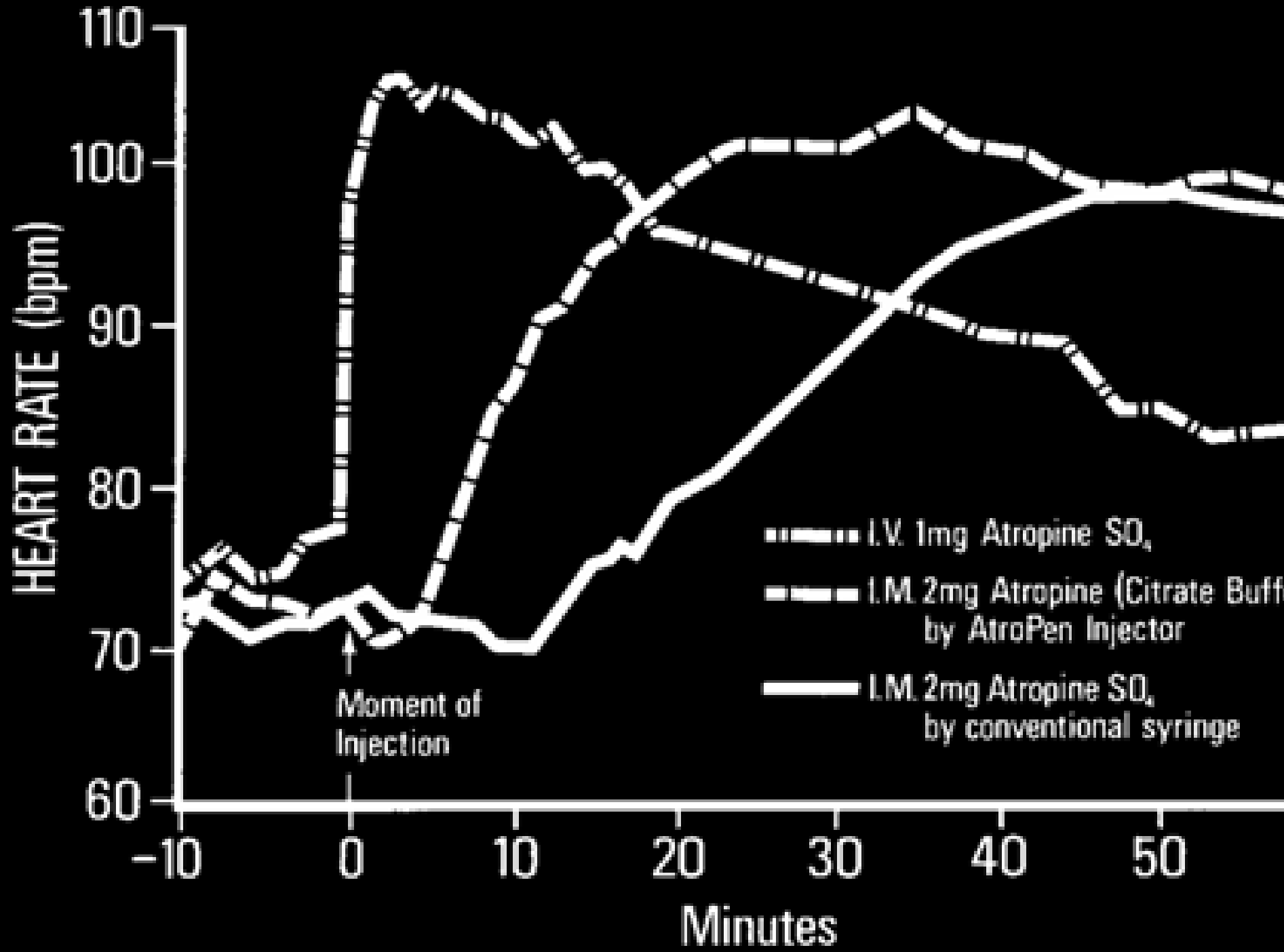
Who uses atropine?

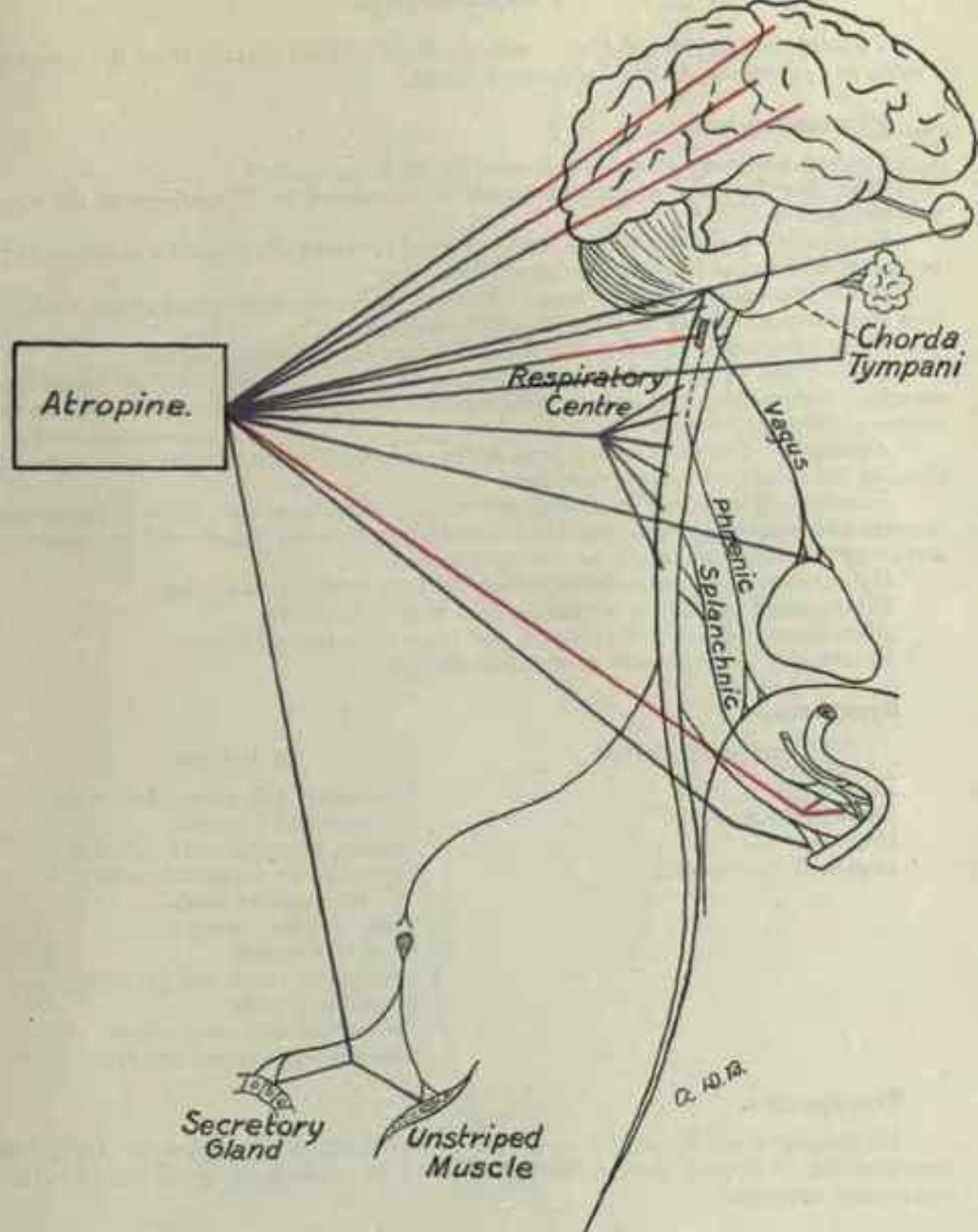
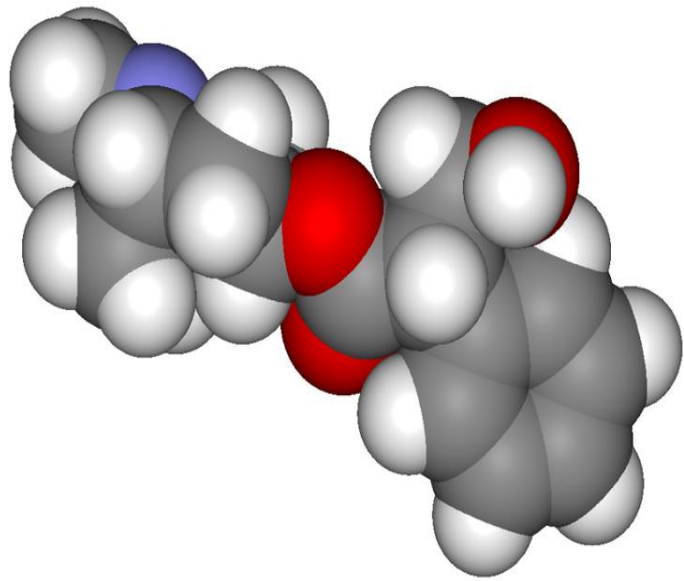
- ▣ For every pediatric anesthetic?
- ▣ For every child requiring intubation?
- ▣ Before succinylcholine?
- ▣ Before every reversal?
- ▣ What are the indications?
- ▣ WHY?





Abbreviations: ACh, acetylcholine; M₂, muscarinic receptor; AC, adenylate cyclase; SA, sinoatrial; AV, atrioventricular

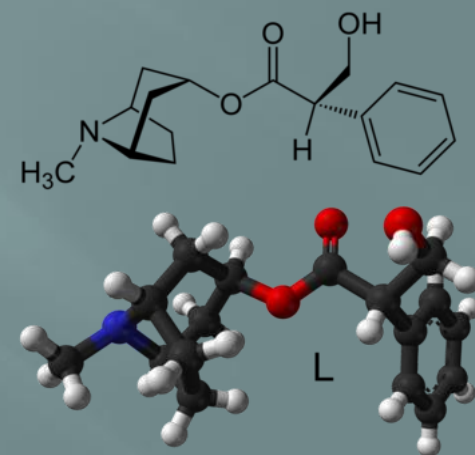
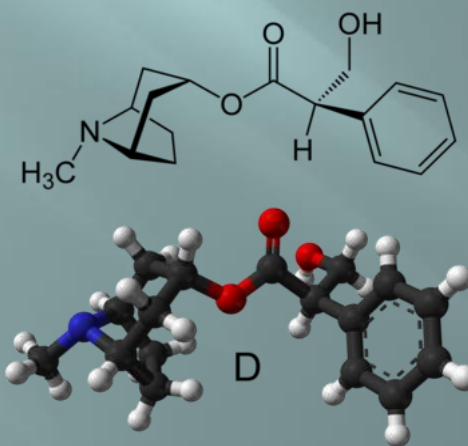






Does it have other uses?

The plant has been used for centuries to treat asthma, diarrhea, intestinal cramps, and nocturia because of its anticholinergic effects, and its hallucinogenic effects were mentioned in Homer's tale, *The Odyssey*.





Any down side?

**mydriasis; dry, flushed skin; hallucinations;
agitation; hyperthermia; urinary retention;
delayed intestinal motility; tachycardia;
and episodes of seizure**




The classic pentad:



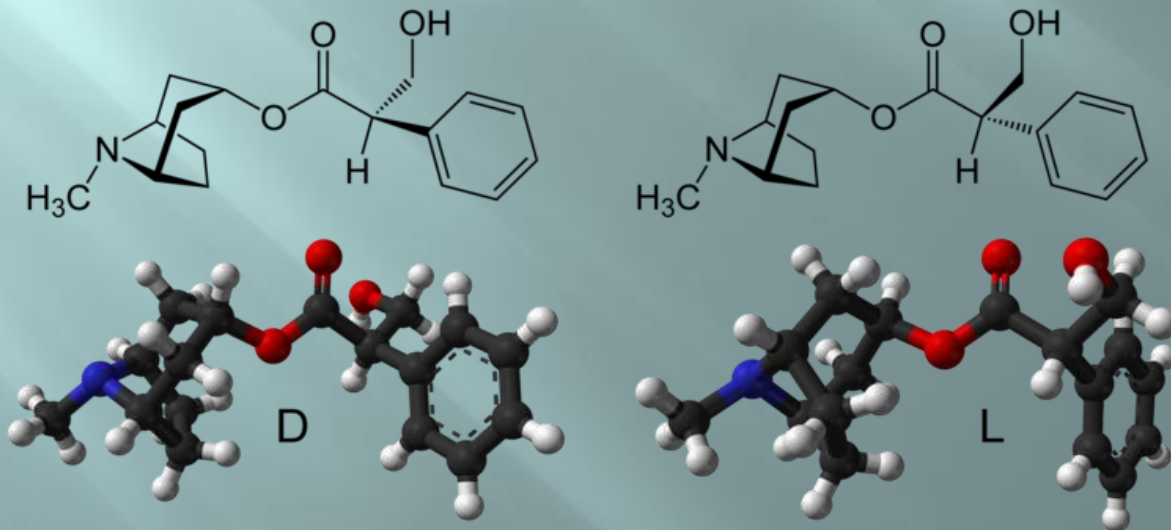
--"blind as a bat, dry as a bone, red as a beet, mad as a hatter, and hot as a hare"--





But what about during intubations

- ▣ Reflex bradycardia with endotracheal intubation?
- ▣ Rapid Sequence Intubation (RSI)?
- ▣ Routine use of atropine?
- ▣ With succinylcholine?





The incidence of reflex bradycardia and its relationship to the administration of atropine during L/TI in a Pediatric Emergency Department.

- retrospective cohort study all patients who received L/TI in the ED at an urban children's hospital from January 1997 to March 2001.
- 143 children study period.
- 68 children received atropine (atropine group)
- 75 did not
- atropine group was younger [mean 22.5 vs. 36.4 months, $P = 0.003$]
- Hypoxia occurred more often in the atropine group [28% vs. 16%, $P = 0.05$]
- Bradycardia in 6 patients ; 3 in the atropine group, and 3 not
- Conclusion: Atropine is not routinely administered prior to L/TI
- Pretreatment with atropine did not prevent bradycardia in all cases.
- These data suggest that use of atropine prior to L/TI may not be required for all children.



Author, date and country

Patient group

Study type (level of evidence)

Outcomes

Key results

Study Weaknesses

Fastle, RK and Roback MG, 2004, USA

143 paediatric patients ranging in age from newborn to 19 years who underwent RSI from 1997 to March 2001 in a level 1 paediatric hospital. The study used ACEP recommendations to determine those patients who should receive atropine and those who should not 68 in the atropine group and 75 in the no-atropine group.

Retrospective cohort study

Bradycardia (two standard deviations below the mean for age or a 30% decrease from baseline HR on presentation).

3 in the atropine group and 3 in the no-atropine group.

The study is of insufficient power and design. This was a retrospective study and all medical data was abstracted from the medical record. The principle investigator was not blinded to the results. Most patients in this study received rocuronium and reflex bradycardia was seen only 4% of the time regardless of whether atropine was given or not. **16 of the 143 patients received succinylcholine and none of these experienced any bradycardic events.**

McAuliffe et al, 1995, Canada

41 ASA class I or II children aged 1 to 12 undergoing elective surgery Those with a history of neuromuscular disease, medications known to affect neuromuscular function, or malignant hyperthermia were excluded. Atropine (20 ug/kg) and succinylcholine (1.5 mg/kg) vs succinylcholine alone

Randomized single blinded control study

Episodes of bradycardia

1 vs 0

It was assumed prior to the study that succinylcholine induced bradycardia occurs 50% of the time so that is what figure was used for the power calculation. However, there were no bradycardic events during the study making the power insufficient to show there is a difference between succinylcholine-induced bradycardia with and without atropine. This study was done in the operating room in a controlled setting which is a different

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The evidence from the study would indicate that the incidence of reflex bradycardia in children during rapid sequence intubation is much lower than previously reported. Furthermore, the use of a succinylcholine pre-treatment agent reduces the incidence of reflex bradycardia following RSI. The study also indicates that the use of a succinylcholine pre-treatment agent is a stronger predictor of reflex bradycardia following RSI.

**185
patients!**



Myth: Atropine should be administered before succinylcholine for neonatal and pediatric intubation

Bethany Fleming, BA, BS; Maureen McCollough, MD; Sean O. Henderson, MD
From the Department of Emergency Medicine, Keck School of Medicine of the
University of Southern California, Los Angeles, Calif.
Can J Emerg Med 2005;7(2):114-7

Most studies recommending atropine premedication were undertaken in the operating room setting and pertained to repeated succinylcholine dosing. Furthermore, there is little published evidence to indicate that succinylcholine-related bradycardia is a clinically important side effect. Several authors have called for the practice to cease, but, to date, these calls have gone unheeded. We found no evidence supporting atropine's use in pediatric patients prior to single-dose succinylcholine. Atropine premedication for emergency department rapid sequence intubation is unnecessary and should not be viewed as a "standard of care."



So where are we in pediatric anesthesia today?

- ▣ We reviewed the anesthesia practice at CHLA
- ▣ We used our automated data record – Compurecord
- ▣ We considered patients <12 years old
- ▣ ASA 1-2
- ▣ Endotracheal Intubation
- ▣ Elective, Day Surgery
- ▣ Succinylcholine used?





Patients

- ▣ We studied 10,000 immediately previous patients who met the study criteria
- ▣ Years 2003- 2009





Study

- ▣ We looked for whether atropine was given before intubation – pretreatment.
- ▣ We looked for bradycardia defined:
 - as HR drop $> 20\%$ or
 - HR < 60 bpm in children within 10 minutes.
- ▣ We searched for atropine delivered after intubation – only given four times.



Results: all patients



	pretreatment	not	totals
N	972 (10%)	9028	10000
Age range (d)	18-4378	0-4372	
Age avg (\pmSD)	1728 (1147) 4.6 y	1763 (1253) 4.7y	1759
Male	579 (60%)	5292 (59%)	59%
Wgt (kg)	3.4 – 82.5	2.7 - 117	
Wgt avg (kg)	20 (12)	21 (14)	
<1 yr	145 (8.6%)	1535	1680
1-12 y	827 (9.9%)	7493	8320



Results: succinylcholine (85/10,000)

	succinylcholine	not	total
Atropine Pretreatment	14 (0.7%,)	958	972
Not	71 (0.8%)	8957	9028
< 1 yr	16 (2; 12.5%)	1664 (129, 8%)	1680
1 - 12 y	69 (12; 17.4%)	8251 (758, 9%)	8320
Total	85 (14; 16%)	9915	10,000

Atropine before succinylcholine for intubation is rare



Did this practice prevent bradycardia



Who had a heart rate decrease of > 20% below baseline?

- ▣ No one under one year had a HR↓>20%.
regardless of pretreatment or succinylcholine
or intubation.
- ▣ No one treated with succinylcholine had a HR↓>20%.
- ▣ Pretreatment 0.0025
- ▣ Not pretreated 0.0050 twice as common





Who over 12y had a 20% heart rate decrease?

- ▣ With atropine 2/816 25/10,000
- ▣ Without atropine 32/7412 43/10,000
- ▣ It seems that atropine reduced the; incidence of decreased heart rate by 40%.





Who had a bradycardia <60 bpm

	atropine	Per 10,000	not	Per 10,000	total	Per 10,000
<1 y	0/145	-	2/1535	13	2/1680	12
1-12 y	4/827	48	66/7493	88	70/8320	84
total	4/972	41	68/9028	75	72/10000	72



Was any of this clinically significant?

Only four patients received atropine after intubation with a HR < 60 bpm.



Bradycardia <60 bpm

Atropine preRx	gender	Age (y)	Hgt (cm)	Wgt (kg)	ASA	
yes	male	9	137	35.4	2	EGD + colonoscopy
No	Male	3	98	18.5	2	Ad + Tonsills
No	Male	8	125	22.2	1	Lap orchiopexy
No	male	5	104	16.4	2	Ad + Tonsills



Conclusions

- ▣ No infants <1y had bradycardia.
- ▣ Succinylcholine did not cause bradycardia (only 85 events).
- ▣ Infants, and succinylcholine use did not seem to require Atropine.
- ▣ The incidence of a HR decrease that was treated was 4 per 10,000. (1:3,500 -NTT)
- ▣ In children between 1-12y atropine decreased the incidence of bradycardia (<60, <20%) by about 40%.



Anything else?

- Really big data bases are here in anesthesiology.
- They can provide answers more effectively than small, single centre studies.
- Will be important for quality improvement.
- We will need to understand database research, data mining, statistics and data collection methodologies.



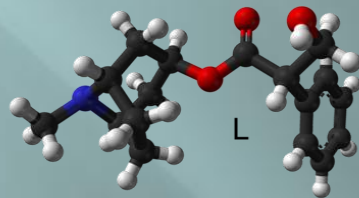
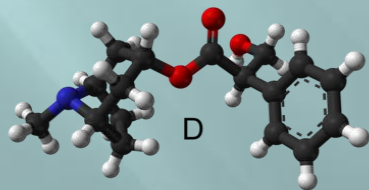
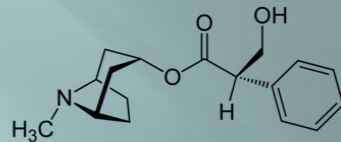
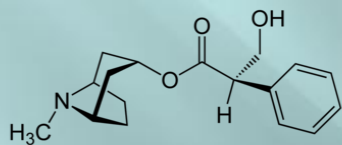
Wake-up-Safe

A SPA / ASA sponsored prospective database of anesthesia complications nationally.





THANK YOU !!



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