



# USE OF NEUROMUSCULAR BLOCKERS IN ANESTHESIA OF SMALL ANIMALS. NEW DRUGS AND MONITORING TECHNIQUES

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## INTRODUCTION

### What are neuromuscular block (NMB)?

The NMB are drugs that abolish the voluntary muscle contraction and modify the slight tension during patients anaesthesia.

### Where do neuromuscular block agents (NMBA) act?

The NMB act at the neuromuscular junction and block the acetylcholine receptors preventing the propagation of nerve stimulation (Figure 1).

### Kind of NMBAs:

- 1) **Depolarizing block:** These drugs are competing with acetylcholine for the nicotinic receptor (competitive antagonist). The effects can not be reversed.
- 2) **Non-depolarizing block:** These drugs act in the acetylcholine receptor and block the neuromuscular junction after an initial stimulation. This effects can be reversed with specific agents.

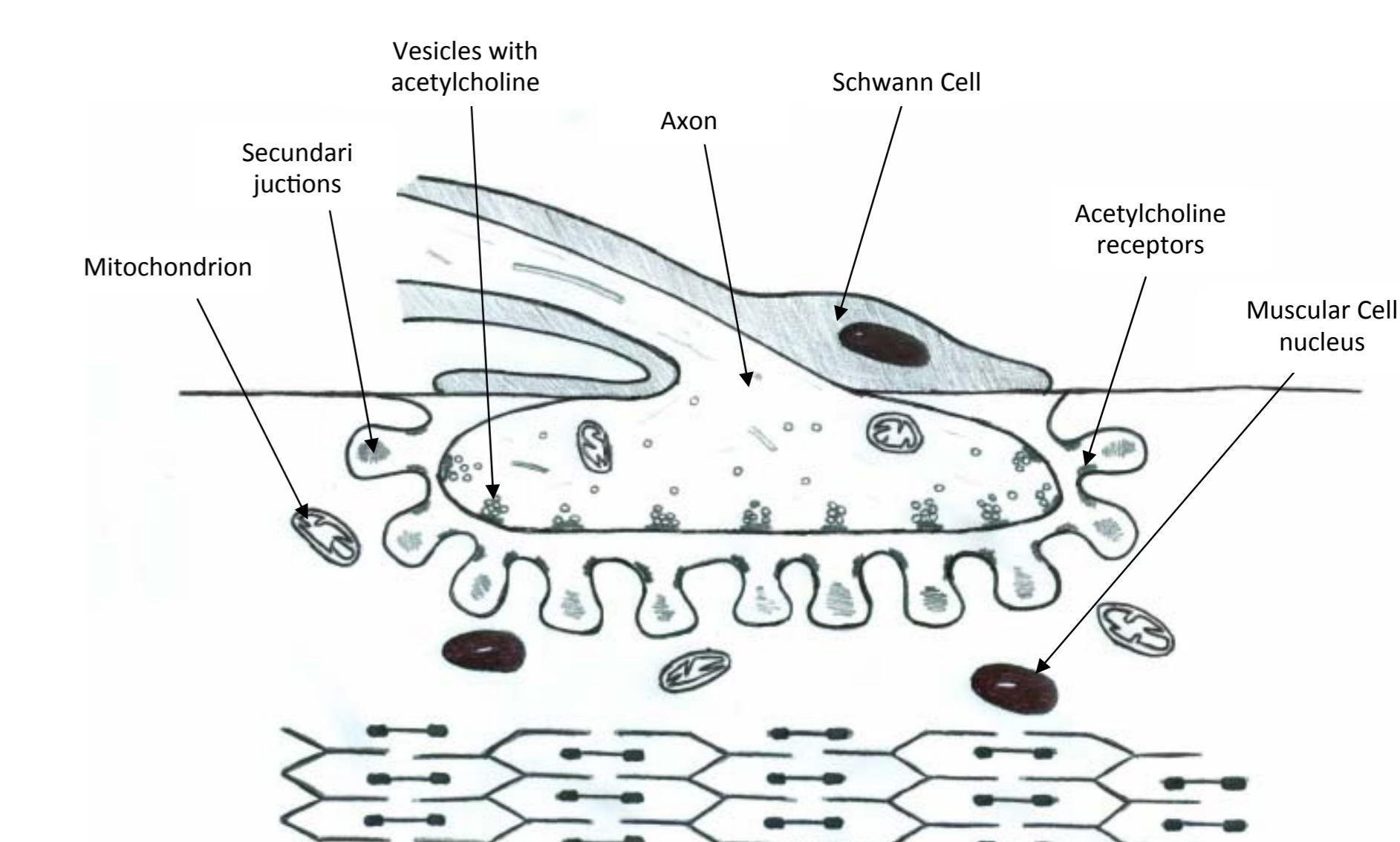


Figure 1: Neuromuscular junction

## KIND OF NEUROMUSCULAR BLOCK

The main RNM used both in human medicine and veterinarian medicine are shown in this table:

	Human		Dog		Cat	
Drug	Dose (mg/kg)	Duration (min)	Dose (mg/kg)	Duration (min)	Dose (mg/kg)	Duration (min)
Atracurium	0.5	46	0.5	40	0.25	40
Cisatracurium	0.1	46	0.6	8.9*	-	-
Mivacurium	0.15	16.8	0.02	3*	-	-
Rocuronium	0.6	36	0.5	20	0.5	30
Pancuronium	0.1	100	0.1	40	-	-

\* 100% block

## MONITORING OF NEUROMUSCULAR BLOCK (TOF-WATCH®)

The TOF-WATCH is an advanced monitoring equipment that incorporate an nerve stimulate sistem and a recording electrodes (Figure 2). The electric stimulation is applies in the ulnar or peroneal nerve for easier access (Figure 3). The recording electrodes are placed where the movement resulting from muscle contraction is to occur. There are not studies showing that electromyography recording system give better data than others systems like acceleromyography.



Figure 2: TOF-WATCH® equipment



Figure 3: Site for stimulation of the ulnar nerve

## CISATRACURIUM

Cisatracurium is one of the 10 isomers of atracurium (Figure 4, 5). It's a non-depolarizing drug which is 4 times more powerful than Atracurium.

- **Human medicine:** Cisatracurium is used more than Atracurium because it produce fewer Laudanosin and has fewer side effects.
- **Veterinary medicine:** There are few studies in small animals about cisatracurium. Studies in dogs and cats shows that it does not change blood pressure and heart rate. Another study in dogs shows that it is secure in patients who has liver abnormalities.

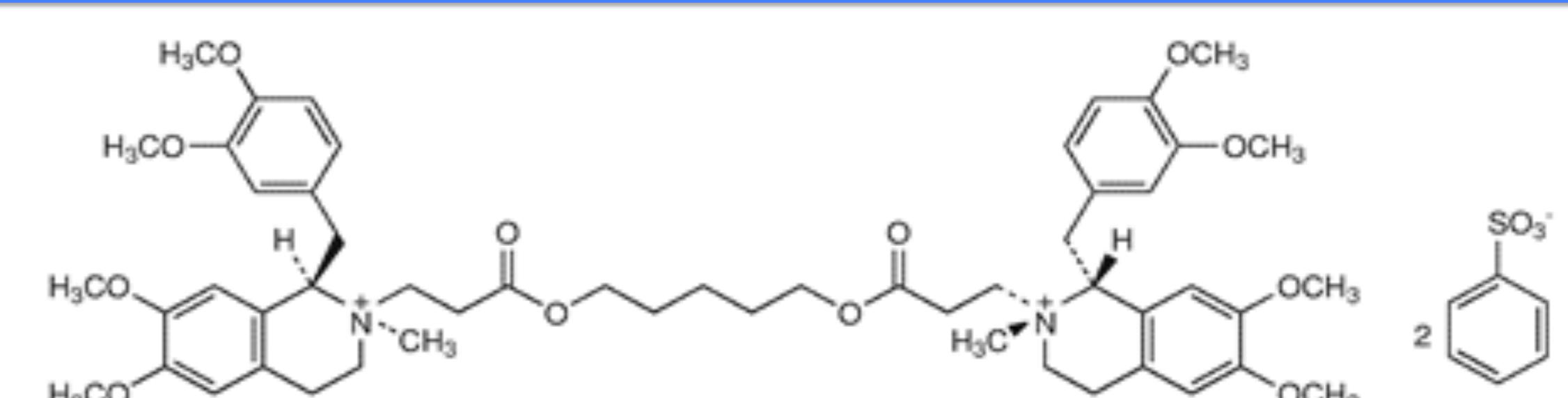


Figure 4. Chemical structure of Cisatracurium

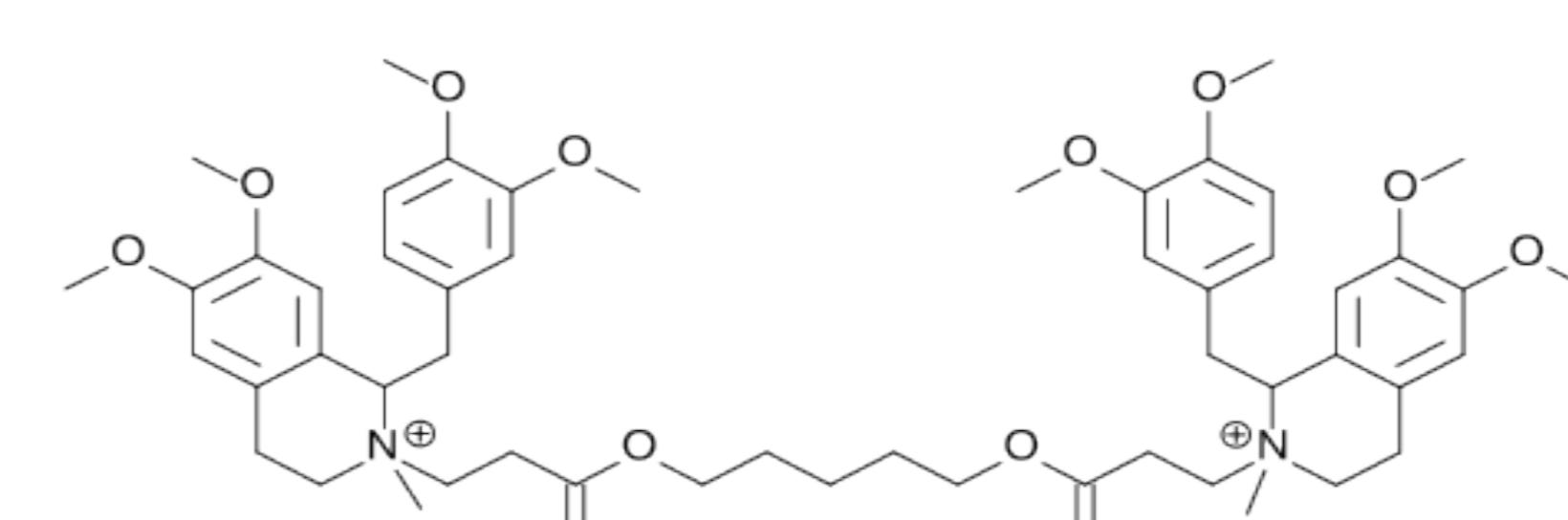


Figure 5: Chemical structure of Atracurium

## CONCLUSIONS

- 1) Nowadays the most RNM used in small animal medicine is atracuri.
- 2) The cisatracuri is widely use in human medicine because of his fewer side effects in comparison with other RNM.
- 3) There are not a lot of studies in veterinarian medicine about cisatracuri used in small animals.
- 4) Dog and cats few studies show that cisatracuri does not has cardiovascular effects.
- 5) The TOF-WATCH® equipment is valid to monitor RNM in a diary veterinary clinic.