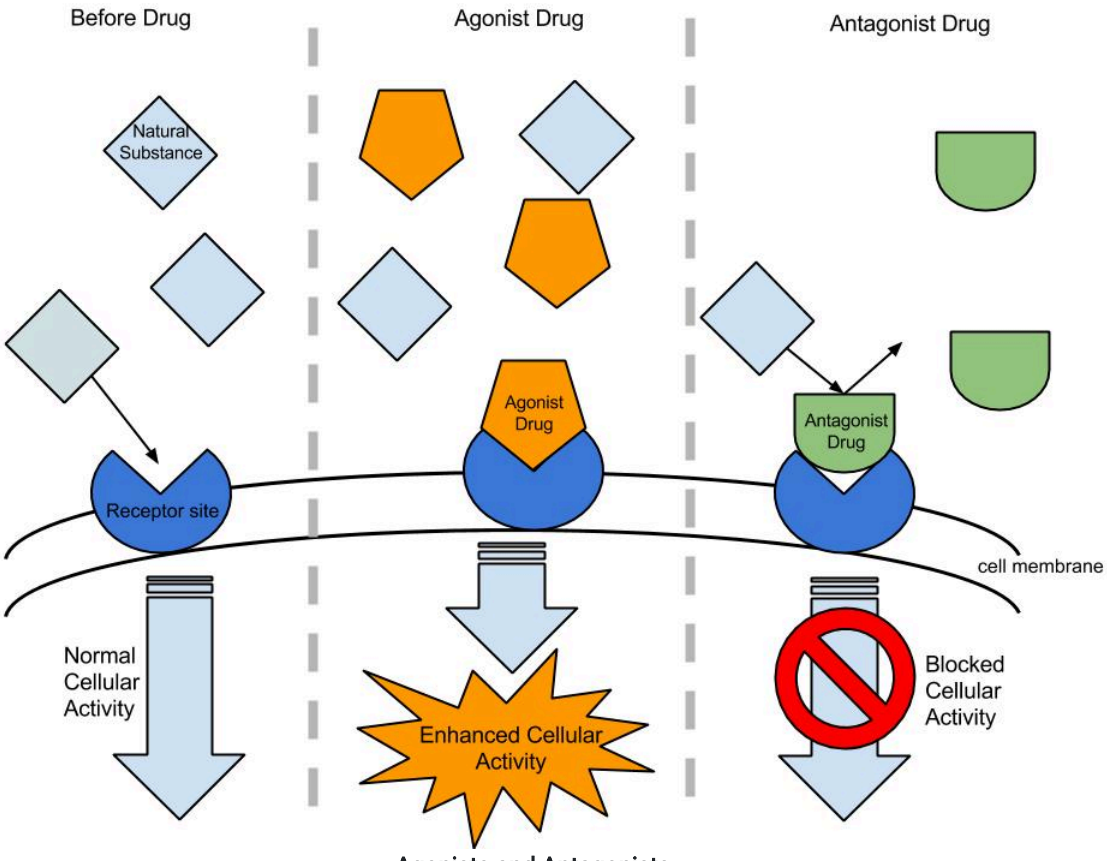
2.3.6

Muscle Pharmacology

At this point, you may be thinking, “how on earth did anyone figure out this stuff?” To answer this question you need to understand that scientists who study physiological processes often employ drugs. Yep, drugs! A drug that has the same effect as acetylcholine will result in all kinds of information about how something works. We use the terms agonist and antagonist when referring to drugs. A drug that has the same effect as the neurotransmitter (acetylcholine) would be considered an **agonist**. A drug that blocks the effect of the neurotransmitter is called an **antagonist**.



Agonists and Antagonists

Agonist & Antagonist. Author: Dolleyj Site: https://commons.wikimedia.org/wiki/File:Agonist_%26_Antagonist.jpgLicense: CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons.

Look at the table below of different drugs used in the study of muscle physiology and see if you can predict the effect the drug would have on a muscle.

Class of Drug	Example	Method of Action	Result on muscle?
Neuromuscular blocker	tubocurarine (chemical obtained from the bark of a South American plant, used as arrow poison); alpha bungarotoxin (snake poison), pancuronium (lethal injection drug)	Acetylcholine receptor antagonist	Flaccid paralysis
Neuromuscular blocker	Succinylcholine (a synthesized chemical, known as the “perfect poison” for murder)	Acetylcholine receptor antagonist (initial depolarization but then blocks the receptor)	Flaccid paralysis
Neuromuscular junction	Neostigmine (a synthesized chemical)	Inhibits Acetylcholinesterase activity	Spastic paralysis
Contractility	Salbutamol (a synthesized chemical also known as albuterol)	Enhances SERCA pump activity	Reduced contractility
Contractility	Caffeine (chemical found in seeds, nuts or leaves, used as an insecticide by the plants)	Enhances Ca2+ release at the sarcoplasmic reticulum	Increased contractility
Neuromuscular junction	Botulism	Blocks SNARE proteins	Flaccid Paralysis
Neuromuscular junction	Latrotoxin (Black widow spider poison)	SNARE protein agonist	Spastic paralysis