

In the last Pharmacology Corner we introduced **ligands** (the molecules that bind to receptors). Ligands that activate a receptor to produce a biological response are called **agonists**. Ligands that block agonist mediated responses (rather than eliciting a biological response from binding itself) are called **antagonists**.

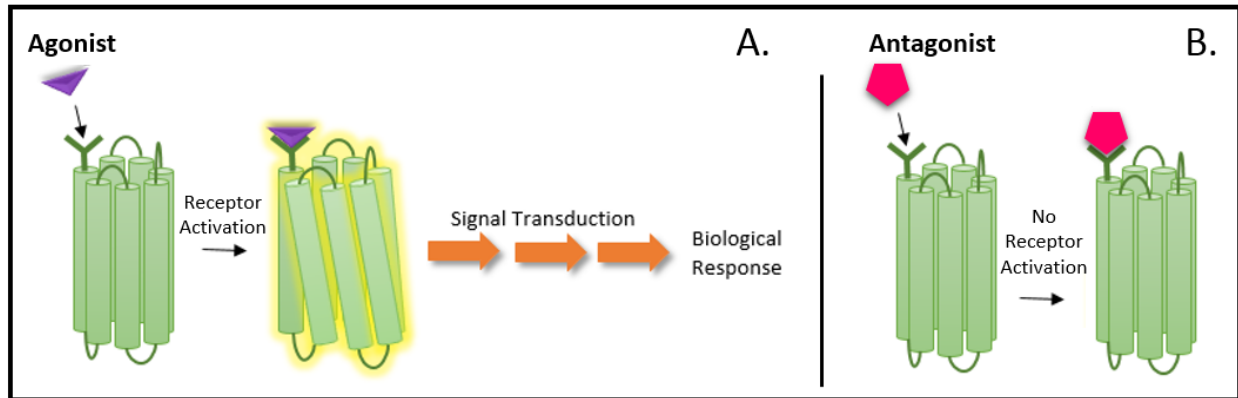


Figure 1. Cartoon of an agonist and antagonist binding to a receptor.

A. An agonist binds to a receptor and the receptor is activated, signal transduction occurs, and the outcome is a biological response. **B.** An antagonist binds to a receptor and blocks the receptor for binding by any agonists. There is no biological response.

There are several types of agonists – they exist on a spectrum that is measured against the endogenous agonist present in the body that binds to the same receptors. For example, the endogenous ligand for dopamine receptors in the brain is dopamine, but there are many drugs that also bind to the dopamine receptor.

Some examples to types of agonists include:

- Endogenous agonist: naturally present in the body and bind to and activate the receptor
- Super agonist: capable of binding to the receptor and producing a greater maximal response than the endogenous agonist
- Full agonist: activates the receptor and produces full efficacy equal to that of the endogenous ligand
- Partial agonist: binds and activates the receptor, but only with partial efficacy relative to the endogenous and full agonists
- Inverse agonist: binds to the receptor and inhibits the normal activity AND exerts the opposite pharmacological activity (this is different from an antagonist that merely blocks the receptor, this activates, but activates the opposite way!)
- Irreversible agonist: binds and activates the receptor but the binding is permanent; so, this happens only once and the receptor is essentially destroyed

With all of the options with receptors, ligands, biological pathways, and genetic variations, research scientists, pharmacologists, and pharmaceutical companies have worked to develop many possibilities for therapeutics and treatments for diseases and disorders to find those that work best for people. It is easy to how there so many options when you are seeking treatment and why it is important to discuss all medications and dietary supplement products with your physician.

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