

## Novocain - Clinical Pharmacology

Novocain stabilizes the neuronal membrane and prevents the initiation and transmission of nerve impulses, thereby effecting local anesthesia. Novocain lacks surface anesthetic activity. The onset of action is rapid (2 to 5 minutes) and the duration of action is relatively short (average 1 to 1½ hours), depending upon the anesthetic technique, the type of block, the concentration, and the individual patient.

<http://www.drugs.com/pro/novocain.html>

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How can novocain works on axon membrane?

In brief: sodium channels. Local anesthetics work on the neuron's sodium channels inhibiting ion exchange and therefore depolarization of the nerve. Novocaine is the trade name for procaine. Procaine is an ester. It blocks sodium channels thus preventing propagation along the axons.

[https://www.healthtap.com/user\\_questions/826924](https://www.healthtap.com/user_questions/826924)

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### **How do the chemicals in Novocain work to numb a certain part of the body?**

#### **Answer 1:**

Messages about sensation or movement move through the cells of the nervous system. Let's look at how nerve cells (neurons) work. Inside the neurons, messages travel by a sort of bioelectrical impulse called an action potential. Neurons communicate with each other with chemicals.

Let's say that neuron 1 pick up a sensation of pain. It "fires" and the action potential travels all the way to the end of the neuron. Neurons don't touch each other, but when neuron 1 fires, it sends out chemicals called "neurotransmitters" that travel to the next neuron. The neurotransmitter then causes the next neuron to fire. This is how the pain signal gets sent to the neurons in your brain, which also fire, telling you that you're in pain.

When a nerve fires, what's going on is that positively charged sodium ions go into the neurons, then they leave so that it can fire again. This happens all along the neuron. At the end of the neuron,

little packets of neurotransmitters are being released into the space between neuron 1 and neuron 2 (the synapse). Then neuron 2 gets the message and can have its own action potential. Sound complicated? This is actually the simplified version, but it's enough to let me answer your question.

Novocaine works by keeping neurons from communicating with each other. Neuron 1 can still send a pain message, but when neuron 2 gets the message, it can't open the ion gates that cause the neuron to fire and send the message through the neuron. So the pain signal never goes to your brain.

### Answer 2:

Novocain, like most narcotics, blocks the chemical receptors on nerve cells that sense pain, preventing the neurotransmitter chemicals from binding to the receptors and stimulating the sensory neurons to fire. An injection of Novocain will affect only nearby tissues because the blocking of receptors uses up the Novocain, and a single molecule of Novocain cannot be on several receptors at once.

<http://scienceline.ucsb.edu/getkey.php?key=2383>

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Two broad classes of pharmacologic agents, local and general, can result in anesthesia. **Local anesthetics, such as Novocain, block nerve transmission** to pain centers in the central nervous system by binding to and inhibiting the function of an ion channel in the cell membrane of nerve cells known as the sodium channel. This action obstructs the movement of nerve impulses near the site of injection, but there are no changes in awareness and sense perception in other areas.

In contrast, **general anesthetics induce a different sort of anesthetic state, one of general insensibility to pain.** The patient loses awareness yet his vital physiologic functions, such as breathing and maintenance of blood pressure, continue to function. Less is known about the mechanism of action of general anesthetics compared to locals, despite their use for more than 150 years. The most commonly used **general anesthetic agents are administered by breathing** and are thus termed inhalational or volatile anesthetics. They are structurally related to ether, the original anesthetic. **Their primary site of action is in the central nervous system, where they inhibit nerve transmission by a mechanism distinct from that of local anesthetics. The general anesthetics cause a reduction in nerve transmission at synapses, the sites at which neurotransmitters are released and exert their initial action in the body**

<http://www.scientificamerican.com/article/how-does-anesthesia-work/>

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