

What is anesthesia?

Anesthesia is a medical treatment that prevents patients from feeling pain during surgery. It allows people to have procedures that lead to healthier and longer lives.

To produce anesthesia, doctors use drugs called anesthetics. Scientists have developed a collection of anesthetic drugs with different effects. These drugs include general, regional, and local anesthetics. General anesthetics put patients to sleep during the procedure. Local and regional anesthetics just numb part of the body and allow patients to remain awake during the procedure.

Depending on the type of pain relief needed, doctors deliver anesthetics by injection, inhalation, topical lotion, spray, eye drops, or skin patch.



Every year, millions of Americans safely undergo surgery with anesthesia. Credit: iStock.

What is general anesthesia?

General anesthesia affects the whole body, making patients unconscious and unable to move. Surgeons use it when they operate on internal organs and for other invasive or time-consuming procedures such as back surgery. Without general anesthesia, many major, life-saving procedures would not be possible, including open-heart surgery, brain surgery, and organ transplants.

Doctors provide general anesthetics either directly into the bloodstream (intravenously) or as an inhaled gas. General anesthesia delivered intravenously will act quickly and disappear rapidly from the body. This allows patients to go home sooner after surgery. Inhaled anesthetics may take longer to wear off.

General anesthetics typically are very safe. But they can pose risks for some patients, such as the elderly or people with chronic illnesses such as diabetes. Also, side effects may linger for several days in some patients, especially the elderly and children.

Serious side effects—such as dangerously low blood pressure—are much less common than they once were. Still, as with any medical procedure, some risks exist. To minimize these risks, specialized doctors called [anesthesiologists](#) carefully monitor unconscious patients and can adjust the amount of anesthetic they receive.

What are local and regional anesthesia?

Doctors use local and regional anesthetics to block pain in a part of the body. With these anesthetics, patients stay conscious and comfortable. Usually, patients may go home soon after surgery.

Local anesthetics affect a small part of the body, such as a single tooth. They are often used in dentistry, for eye surgeries such as cataract removal, and to remove small skin growths including warts and moles.

Regional anesthetics affect larger areas, such as an arm, a leg, or everything below the waist. For example, this sort of anesthesia is used for hand and joint surgeries, to ease the pain of childbirth, or during a C-section delivery.



Dental injections deliver local anesthetics that numb part of the mouth. Credit: iStock.

How does anesthesia work?

Until recently, we knew very little about how anesthetics work. Scientists are now able to study how the drugs affect specific molecules within cells. Most researchers agree that the drugs target proteins in the membranes around nerve cells. Because inhaled anesthetics have different effects than intravenous ones, scientists suspect that the two different types of drugs target different sets of proteins.



Anesthesiologists use digital devices to monitor patients' vital signs throughout surgery. Credit: iStock.

What do anesthesiologists do?

Anesthesiologists are doctors who carefully monitor patients throughout surgery and during recovery. They use highly advanced electronic devices that constantly display patients' blood pressure, blood oxygen levels, heart function, and breathing patterns. These devices have dramatically improved the safety of general anesthesia. They also make it possible to operate on many patients who used to be considered too sick to have surgery.

Anesthesiologists also provide pain relief for less invasive procedures, such as those used to examine

blood vessels and internal organs (endoscopy) and during labor and delivery.

As experts in pain management, anesthesiologists may advise patients and their doctors on how to manage pain.

How are anesthesiologists trained?

Like all medical doctors, anesthesiologists earn a college degree, often in a life sciences field, then a medical degree (M.D. or D.O.). After that, they complete a 4-year residency program in anesthesiology. Many also train for an additional year or more in a specialty such as pain management, pediatric anesthesiology, or critical care medicine.

What does the future hold for anesthesiology?

Scientists are learning more about how anesthetics work at the most basic level. They are also studying the short- and long-term effects of these drugs on specific groups of people, such as the elderly and cancer survivors. These studies will reveal whether certain anesthetics are better than others for members of those groups.

Research on how a person's genetic makeup affects how he or she responds to anesthetics will allow doctors to further tailor drugs for each patient. In the future, scientists hope to design anesthetics that are safer, more effective, and more personalized.

Knowing how anesthetics affect pain and consciousness could also lead to new treatments for conditions that affect consciousness, such as epilepsy or coma. Studies of anesthesia may even help us better understand the nature of consciousness itself.

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