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Waking Up to Anesthesia Learn More Before You Go Under

When you face surgery, you might have many concerns. One common worry is about going under anesthesia. Will you lose consciousness? How will you feel afterward? Is it safe?

Every day about 60,000 people nationwide have surgery under general anesthesia. It's a combination of drugs that's made surgery more bearable for patients and doctors alike. General anesthesia dampens pain, knocks you unconscious and keeps you from moving during the operation.

"Prior to general anesthesia, the best ideas for killing pain during surgery were biting on a stick or taking a swig of whiskey," says Dr. Emery Brown, an anesthesiologist at Massachusetts General Hospital in Boston. Things improved more than 150 years ago, when a dentist in Massachusetts publicly demonstrated that the anesthetic drug ether could block pain during surgery. Within just a few months, anesthesia was being used in Australia, Europe and then around the world.

"General anesthesia changed medicine practically overnight," says Brown. Life-saving procedures like open-heart surgery, brain surgery or organ transplantation would be impossible without general anesthesia.

General anesthesia affects your entire body. Other types of anesthesia affect specific regions. Local anesthesia—such as a shot of novocaine from the dentist—numbs only a small part of your body for a short period of time. Regional anesthesia numbs a larger area—such as



everything below the waist—for a few hours. Most people are awake during operations with local or regional anesthesia. But general anesthesia is used for major surgery and when it's important that you be unconscious during a procedure.

General anesthesia has 3 main stages: going under (induction), staying under (maintenance) and recovery (emergence). NIH-funded scientists are working to improve the safety and effectiveness of all 3.

The drugs that help you go under are either breathed in as a gas or delivered directly into your bloodstream. Most of these drugs act quickly and disappear rapidly from your system, so they need to be given throughout the surgery. A specially trained anesthesiologist or nurse anesthetist gives you the proper

doses and continuously monitors your vital signs—such as heart rate, body temperature, blood pressure and breathing.

"When patients are going under, they experience a series of deficits," says Dr. Howard Nash, a scientist at NIH's National Institute of Mental Health.

"The first is an inability to remember things. A patient may be able to repeat words you say, but can't recall them after waking up."

Next, patients lose the ability to respond.

"They won't squeeze your fingers or give their name when asked," Nash says. "Finally they go into deep sedation."

Although doctors often say that you'll be asleep during surgery, research has shown that going under anesthesia is nothing like sleep. "Even in the deepest stages of sleep, with prodding and poking we can wake you up," says Brown. "But that's not the case with general anesthesia. General anesthesia looks more like a coma—a reversible coma." You lose awareness and the ability to feel pain, form memories and move.

Once you've become unconscious, the anesthesiologist uses monitors and medications to keep you that way. In rare cases, though, something

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can go wrong. About once in every 1,000 to 2,000 surgeries, patients may gain some awareness when they should be unconscious. They may hear the doctors talking and remember it afterward. Worse yet, they may feel pain but be unable to move or tell the doctors.

"It's a real problem, although it's quite rare," says Dr. Alex Evers, an anesthesiologist at Washington University in St. Louis. "Anesthesia awareness can lead to post-traumatic stress disorder," a severe anxiety disorder that can arise after a terrifying ordeal.



Wise Choices When You Go Under

General anesthesia has 5 major effects on your body. Researchers are working to develop drugs that target each of these characteristics:

- **Lack of Consciousness.** Keeps you from being aware of your surroundings.
- **Analgesia.** Blocks your ability to feel pain.
- **Amnesia.** Prevents formation of memories.
- **Loss of Movement.** Relaxes your muscles and keeps you still during surgery.
- **Stable Body Functions.** Stabilizes your heart rate, blood pressure, temperature, breathing and kidney function.

Scientists have developed strategies to identify and prevent anesthesia awareness. Small studies suggested that brain monitors might help. But in 2008, Evers and his colleagues reported the results of the largest study to compare different techniques. Brain monitoring did no better than standard monitoring in preventing anesthesia awareness.

Addiction to alcohol or drugs increases the risk for anesthesia awareness, but doctors can't accurately predict who will be affected. A research team in Canada identified variations in a **gene** that may allow animals to form memories while under anesthesia. Ongoing studies are exploring whether this gene plays a role in anesthesia awareness in people.

Other researchers are searching for genes that may affect how anesthetic drugs are processed, or metabolized, by the body. Genetic differences might affect the proper dosage or the selection of drugs for each patient.

Nash and his colleagues have found that studies of the common fruit fly may offer clues to how genes affect anesthesia. When certain repeating segments—called copy number variations—are snipped from the



Definitions

Gene

A stretch of DNA, a substance you inherit from your parents, that defines characteristics such as eye color, your risk for disease and your likely response to different medications.



Web Links

For more information about anesthesia, see our links online:

<http://newsinhealth.nih.gov/issue/Apr2011/Feature1>

fly's genome, it affects the insect's response to anesthesia. Copy number variations are known to affect human responses to other drugs. Nash suspects that these gene segments may also affect how patients react to anesthesia. "As researchers learn more, I expect genetic screening will become more common in the clinic," says Nash.

After surgery, when anesthesia wears off, you may feel some pain and discomfort. How quickly you recover will depend on the medications you received and other factors like your age. About 40% of elderly patients and up to one-third of children have lingering confusion and thinking problems for several days after surgery and anesthesia.

Right now, the best cure for these side effects is time. Brown and his colleagues are working to develop drugs to help patients more quickly emerge and recover from general anesthesia.

Anesthesia is generally considered quite safe for most patients. "Anesthetics have gotten much safer over the years in terms of the things we're most worried about, like the patient dying or having dangerously low blood pressure," Evers says. By some estimates, the death rate from general anesthesia is about 1 in 250,000 patients. Side effects have become less common and are usually not as serious as they once were.

Don't delay important surgery because of fear of anesthesia. If you have concerns, talk with your doctor. It might help to meet in advance with the person who will give you anesthesia. Ask what kind of anesthesia you will have. Ask about possible risks and side effects. Knowing more might help you feel less concerned about going under. ■

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Reflux or GERD?

When Heartburn Spells Trouble

Most of us get heartburn from time to time. It may come as a burning sensation in the chest, or a bitter taste in the back of the throat. Heartburn is one word people use to describe **reflux**. It happens when stomach contents come back upwards. Reflux is sometimes painless: You may have trouble swallowing or get a dry cough, perhaps some wheezing.

Occasional reflux episodes are normal. Like millions of Americans, you can manage reflux by avoiding foods that don't agree with you—things that are fatty, spicy or acidic—or by eating smaller meals. If reflux occurs less than once a week, you can usually cope by making lifestyle changes or using over-the-counter medications.

"We all have a little reflux when we burp or belch," says Dr. John Pandolfino of Northwestern University. But of the 20 million or more Americans with reflux, about 5% have significant episodes 2 or 3 times per day. When severe events occur this often, it's not ordinary reflux. It may be **gastroesophageal** reflux disease (GERD). You may need prescription medications to control it.

GERD should be taken seriously. Stomach (gastric) contents contain acid needed to digest food. In reflux, these contents wash upward into the esophagus, a slender tube connecting the mouth and the stomach. Because the lining of the esophagus isn't meant to touch gastric acid, the acid can irritate the lining of the

esophagus and lead to bleeding and scarring. In adults, GERD can raise the risk of cancer of the esophagus. And if you have asthma, GERD can make it worse.

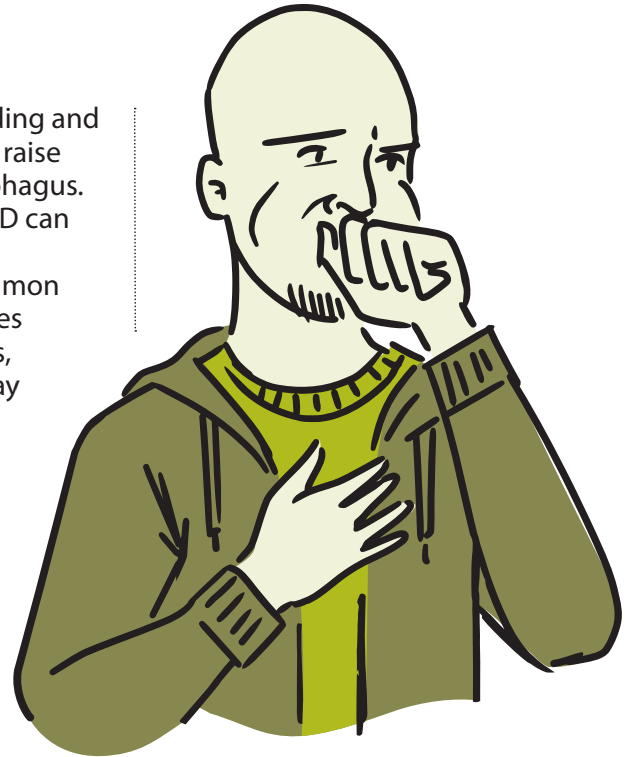
As for babies, reflux is common in healthy infants. Most babies outgrow reflux by 13 months, but if they don't, they too may have GERD.

GERD can harm a child's ability to feed and grow. It can also increase the risk for inhaling stomach contents into the lungs. This can be life-threatening.

People of any age can have GERD. Available medications, whether over-the-counter or prescription, can make the acid in the esophagus less intense. But medications don't prevent GERD. Surgery can be an option if symptoms are severe and medicine and lifestyle changes don't seem to help.

Dr. Michael Raymond Ruggieri, Sr., of Temple University is researching the root causes of GERD. The problem isn't that the stomach makes too much acid. In GERD, the special set of muscles between the esophagus and the stomach is weakened.

"The stomach muscle fibers are not doing their job, and we're trying to understand why they're not," says Dr. Ruggieri. His team is among the first to look at how nerves receive and send messages to these muscle fibers. Their goal is to develop drugs that prevent GERD altogether.



If you have reflux twice or more per week, talk to your health care provider. It's best to start treatment early to prevent GERD from leading to more serious health problems. ■

Definitions

Reflux

When stomach contents rise up into the esophagus

Gastroesophageal

Related to the stomach and the esophagus.

Web Links

For more about heartburn, reflux and GERD, see our links online:
<http://newsinhealth.nih.gov/issue/Apr2011/Feature2>



Wise Choices How To Steer Clear of Reflux

- Maintain a healthy weight.
- Eat smaller meals.
- Avoid triggering foods, including alcohol.
- Don't lie down for 3 hours after a meal.
- Raise the head of your bed 6 to 8 inches by putting wood blocks under the bedposts.
- For an infant, try burping frequently during feeding. Keep the infant upright for 30 minutes after feeding.
- If you have reflux twice or more per week, see your health care provider.



Health Capsules

For links to more information, see these stories online:
<http://newsinhealth.nih.gov/issue/Apr2011/Capsule1>

Barbers Help Beat High Blood Pressure

In a new study, barbers helped to fight high blood pressure in African-American men. The findings suggest that trusted members of the community can deliver important health messages to those who need them.

About 1 in 3 adults nationwide has high blood pressure, or hypertension. African Americans are at especially high risk. Left untreated, high blood pressure can damage the heart, blood vessels and kidneys.

Your genes, diet and other lifestyle factors can affect your chances of getting high blood pressure. The low rate of preventive care among African-American men is one factor that can lead to poor blood pressure control. An NIH-funded research team set out to see if barber-shop-based outreach might help African-

American men beat hypertension.

The study evaluated about 1,300 black men who had hypertension and were patrons of 17 African-American-owned barbershops in Texas. In 9 of the shops, barbers offered blood pressure checks with haircuts and encouraged patrons to follow up with physicians. Patrons of the 8 comparison shops received blood pressure pamphlets written especially for African Americans.

After 10 months, both groups had improved rates of hypertension control. But the shops that offered blood pressure checks showed greater improvement. In these shops, the percentage of participants whose blood pressure dropped to recommended levels improved by 20%, compared to an 11% improve-

ment in the shops that just handed out pamphlets.

"The barbers were the heroes of this story. They really stepped forward and made it part of their barber practice," says researcher Dr. Robert Haley of the University of Texas Southwestern Medical Center. "They helped us show that social settings can be an integral part of health care in the black male population." ■

Booklet Offers Tips for Staying Fit

Spring is here—a perfect time to get outside and get moving. You don't need fancy equipment or a gym membership to get fit. A new NIH booklet shows how you can use what you already have, or can easily get, to improve your health.

The 8-page publication, *The World Around You: Use What You Have to Stay Healthy and Fit*, has realistic suggestions for eating better and getting active. Try different activities to see what works best for you.

You might enjoy walking with "exercise buddies" around a track at the local school. For better

nutrition, try adding canned or frozen vegetables to any pasta or rice dish. Set healthy goals and keep track of your progress. These activities might help you maintain a healthy weight and prevent or delay certain health problems, such as diabetes.

The World Around You is available online at www.win.niddk.nih.gov/publications/way.htm. Or you can order a free copy by contacting NIH's Weight-control Information Network, 1 WIN Way, Bethesda, MD 20892-3665. Call toll-free at 1-877-946-4627 or email win@info.niddk.nih.gov. ■



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Ready to quit smoking? Just starting to think about it? This website can help. A step-by-step guide offers tips as you prepare to quit and supports you in the days and weeks afterward. Download a Smokefree QuitGuide app for your smartphone. Or choose from a variety of other tools and resources that fit your needs.



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