Atrial fibrillation

Finding the right treatment

It's a strange and even frightening sensation — a racing heartbeat that feels irregular, like your heart is flopping in your chest.

More than 2 million Americans have atrial fibrillation, a heart rhythm problem that's increasingly common with advancing age. Among people in their 50s, fewer than one in every 100 people has atrial fibrillation. But for people in their 80s, the disorder affects about 10 in every 100 people.

Although some people never notice the effects of their heart's disrupted rhythm, many more are very much aware. They may experience lightheadedness, weakness, shortness of breath or even chest pain due to the irregular behavior of their heart’s electrical system.

Sometimes, the best choice is to do whatever it takes to get the heart back in sync. This may require treatments ranging from drugs to more invasive procedures that destroy the heart cells that are responsible for creating or sustaining the problem. For some, surgical procedures may be best. For others, it may be best to control the heart rate with drugs and to use blood thinners to prevent clots and other complications.

Mixed signals

Normally, the heart's four chambers — the two upper atria and the two lower ventricles — contract and relax in a coordinated fashion. This is controlled by electrical signals traveling through the heart's conduction system and muscles.

Normally, the heart's four chambers — the two upper atria and the two lower ventricles — contract and relax in a coordinated fashion. Atrial fibrillation occurs when chaotic electrical signals are emitted in several areas of the atria, causing the atria to beat faster and erratically.
As a signal from the heart’s natural pacemaker, the sinus node, passes through the atria, they contract and fill the ventricles below with blood. A split second later, a signal passes through a connecting electrical pathway — the atrioventricular (AV) node — between the upper and lower heart chambers. This causes the ventricles to contract and pump blood out to the body. That’s one heartbeat. Under normal circumstances, it occurs 60 to 100 times a minute.

Atrial fibrillation occurs when chaotic electrical signals are emitted in several areas of the atria, causing the atria to beat faster and erratically. The atria literally quiver (fibrillate) as they race at 300 to 400 beats a minute. Some of these erratic impulses get past the AV node and may lead to rapid heartbeats of 80 to 180 beats a minute or faster.

Quivering atrial chambers are unable to pump blood effectively. The decreased blood flow in the atria may allow clots to form that might break loose and possibly travel to the brain, causing a stroke. The lower chambers of the heart can still pump blood to the rest of the body, but not as efficiently as when the atria are pumping normally.

Reseting the heart

Sometimes, treating an underlying medical condition — such as excessive thyroid hormone production (hyperthyroidism) — is all that’s needed to return the heart’s rhythm to normal.

For people diagnosed with atrial fibrillation who don’t experience any noticeable symptoms and have no underlying condition, the treatment generally is to control how fast the ventricles beat. Drugs such as digoxin (Lanoxin), beta blockers or calcium channel blockers may be prescribed to achieve a more normal or slower heart rate. In addition, a blood-thinning drug such as warfarin (Coumadin) may be prescribed to reduce the risk of blood clots.

On the other hand, treating people with atrial fibrillation who are experiencing symptoms generally requires a different approach to try to achieve cardioversion — that is, to reset the heart to its regular rhythm (sinus rhythm). One avenue is to use anti-arrhythmic medications to try to stop the quivering and restore normal sinus rhythm.

Commonly used anti-arrhythmics include amiodarone (Cordarone, Pacerone), propafenone (Rythmol), flecainide (Tambocor), sotalol (Betapace), and dofetilide (Tikosyn). Anti-arrhythmics may be needed on an indefinite basis. Depending on overall risks, warfarin or aspirin may be used to limit blood-clotting risks.

For some people, resetting the heart's rhythm can be done by delivering a brief electrical shock to the heart. The procedure — called electrical cardioversion — stops the heart’s electrical activity for a split second so that the heart resets itself. About half of those who undergo this treatment must also take antiarrhythmic drugs long term to maintain normal heart rhythm.

If side effects from anti-arrhythmics — such as nausea, dizziness and fatigue — are too troublesome, if symptoms persist or if cardioversion results aren't adequate, more invasive procedures and possibly surgery may be considered.

Beyond cardioversion

Deciding which procedure may offer the best outcome in treating
Atrial fibrillation requires careful consideration of an individual’s needs and overall health. These procedures are ever evolving as cardiology subspecialists — called electrophysiologists — and surgical specialists continue to adapt and improve upon them. Among the options that may be considered are:

- **Pacemaker implantation** — If medications used to control heart rate slow the heart too much, a pacemaker may be recommended.

- **Destroying the AV node (AV nodal ablation) and pacemaker implantation** — This involves guiding a thin tube (catheter) through a vein in the groin up into the heart. There it’s positioned so that focused heat (radiofrequency) can be applied to the AV node to destroy (ablate) it. This effectively disconnects the electrical path that normally connects the atria with the ventricles. With the AV node destroyed, a permanent implanted pacemaker is necessary to control the heart’s rate.

- **Atrial fibrillation ablation, also called pulmonary vein isolation** — This complex procedure is increasingly considered the state-of-the-art approach to treating atrial fibrillation. Whether the treatment is successful is highly dependent on the experience of the electrophysiologist performing the procedure. It, too, is a catheter-based treatment with the objective of destroying or blocking “hot spots” in the heart muscle that otherwise act like abnormal pacemaker cells. These abnormal cells that are triggers for atrial fibrillation can be destroyed using radiofrequency energy. Another approach under investigation is freezing these cells (cryoablation).

Pulmonary vein ablation may be a treatment option if the heart is otherwise normal, or nearly so, but atrial fibrillation symptoms remain intolerable despite drug treatment.

- **Maze procedure** — This procedure involves making a maze of little cuts (incisions) in the atria with the intent of blocking excess electrical impulses. It’s more typically done in conjunction with another procedure that requires an open-chest surgery, such as heart valve repair or coronary bypass.

In an effort to avoid open-chest surgery, minimally invasive techniques involving smaller incisions are in development, but there are no controlled trials to determine their place in the treatment of atrial fibrillation.

### Final words

Deciding which treatment may be best for atrial fibrillation depends on your individual circumstances and overall health.

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**Health tips**

Getting your fluoride

Fluoride can make your teeth stronger and reduce your risk of developing cavities. In fact, the preventive potential of fluoride has been identified as one of the major advances of dentistry in the last century. But what’s the right amount?

If you’re at low risk of developing cavities — meaning that you haven’t had any cavities in the past few years and generally have good oral health — the combination of brushing with fluoride toothpaste twice daily and drinking optimally fluoridated water should give you sufficient exposure to fluoride. And, too much fluoride can cause spots on the teeth (fluorosis).

But if you’re at higher risk — having had cavities recently, a water supply with low fluoride or a problem such as dry mouth that can lead to tooth decay — your dentist may additionally recommend using fluoride treatments at home, or a professional application of fluoride gel two to four times a year.

Talk to your dentist about using fluoride:

- Toothpaste
- Prescribed mouth rinses or gels
- Gels, foams or varnishes that are briefly applied to your teeth at your dentist’s office or prescribed formulations for home use

Fluoride tablets may be helpful for young children, but they’re not of help for adults once enamel has formed.
Toxic metals
Reduce your exposure risk

Lead, mercury and arsenic. Although most significant heavy metal exposures occur in work settings, there are many ways you may encounter these and other toxic metals. They may be in the fish you eat or in the pesticides that you apply to your roses in the summer garden.

Food and hobbies are just a couple of ways you can be exposed to toxic metals at home. Limited or occasional exposure to everyday sources of toxic metals — in particular lead, mercury and arsenic — isn’t likely to result in harmful or fatal health effects. But it’s wise to be aware of them, especially if your lifestyle or hobbies mean you’re encountering these heavy metals on a more regular basis.

Get the lead out

Lead can find its way into the body if it’s inhaled as dust or fumes, ingested through contaminated water or foods, or — in the case of a small toddler or child — eaten in the form of old paint chips.

The introduction of unleaded gasoline in place of leaded gasoline has resulted in reduced lead exposure for everyone. Removal of lead-based paint in the 1970s has been a plus, especially for small children living in homes built since then. However, lead-based paint was commonly used in homes built before 1978. A young child who eats chips or flakes of lead-based paint in a home from that era is susceptible to lead poisoning. That can mean anemia, unexplained stomachaches and developmental delays.

Some tableware — such as leaded crystal and pewter, and some glazed pottery — can be a source of lead, even more so if acidic foods

News and our views

Vitamin D may cut risk of pancreatic cancer

A recent study has reported that adequate vitamin D intake — whether from diet or supplements — may cut the risk of developing pancreatic cancer by nearly half. This is welcome news. Pancreatic cancer is difficult to detect and difficult to treat. It’s one of the leading causes of cancer deaths in the United States, even though it’s a fairly uncommon form of cancer.

In the study, published in the September 2006 issue of Cancer Epidemiology, Biomarkers & Prevention, researchers assessed the diet and supplement use of about 47,000 men and 75,000 women over 16 years. During that time, 365 people developed pancreatic cancer.

After adjusting for factors that might have affected the risk of pancreatic cancer, such as smoking, multivitamin use, age and body mass, researchers found that daily vitamin D intake of between 300 international units (IU) and 600 IU lowered the risk of developing pancreatic cancer by about 43 percent. Intakes higher than that yielded no additional benefit. Intake between 150 IU and 199 IU a day led to a 22 percent reduction in risk.

Although this is an exciting development, Mayo Clinic doctors agree with study authors who say that additional research is needed. Still, the study adds to a growing list of potential health benefits from getting adequate vitamin D, which is produced by your skin when it’s exposed to sunlight. However, to minimize your risk of skin damage, which can lead to melanoma and other skin cancers, it may be safer to get vitamin D from food and supplements.

Cataract surgery and alpha-blocker drugs don’t mix well

If you know you’re going to be having cataract surgery and you’re taking — or have ever taken — an alpha-blocker drug for prostate enlargement, urinary retention or another condition, tell your eye surgeon.

Alpha blockers include tamsulosin (Flomax), terazosin (Hytrin, others), doxazosin (Cardura, others) and alfuzosin (Uroxatral). Alpha-blocker use has been linked to potential problems in getting the eye’s pupil to respond to standard drops used during cataract surgery. Normally, the drops dilate the pupil and keep it dilated during the procedure. But the pupils of those who took alpha blockers — even if the drug had been discontinued — responded differently. Instead of the pupil remaining dilated, it could constrict during surgery, potentially complicating the procedure.

Apparently, alpha blockers interfere with the normal function of the iris dilator muscle. For now, researchers say the effect, even after discontinuing alpha-blocker use, may suggest a long-lasting or possibly permanent loss of muscle tone in the iris dilator muscle.

Surgeons are able to modify their technique if they have knowledge of alpha-blocker use ahead of time. Rather than relying on drops to keep the pupil open, surgeons can use a small device to hold the pupil open and avoid potential complications.
or liquids are stored in or regularly served from them.

If you work with stained glass, maintain proper ventilation. Soldering can produce lead-laden fumes. If your passion is creating pots, check the components in glazes that produce a white or yellow finish — the color in those pigments comes from lead. Handle these glazes carefully and avoid serving acidic foods or liquids from the final products. Exposure is also possible in older houses plumbed with lead pipes and solder.

Be aware that some small jewelry crafted in China may be made with lead. Some supplements and preparations, especially ayurvedic diabetic preparations, may contain lead. And be cautious using dietary supplements, especially products originating from China.

**Quicksilver — that’s mercury**

Mercury occurs in various forms. Centuries ago, English hatters were noted for their madness — no wonder given the continuous contact they had with liquid mercury as they cleaned fur from the pelts needed for hats. But you’re most likely to encounter mercury in its organic form as methyl mercury when eating certain fish or shellfish. Due to “bioaccumulation,” excessive consumption of certain fish can be detrimental to health.

Bioaccumulation begins when mercury enters the aquatic world from natural deposits in rock and granite, and from industrial air pollutants that fall as acid rain. Bacteria in the sediments of rivers, lakes and oceans convert mercury into a form plants can absorb. Smaller fish eat the plants. Predatory fish eat the smaller fish. The methyl mercury is concentrated as it moves up the food chain. Mercury can be especially high in shark, swordfish, tuna, pike, walleye, bass and Atlantic salmon.

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| Some general signs and symptoms of heavy metal toxicity include: |
| Loss of feeling in the fingertips and toes (peripheral neuropathy) |
| Hearing loss |
| Impaired concentration |
| Personality changes |

If there are concerns about exposure to heavy metals, blood and other tests can help determine if your levels are in a toxic range.

Which fish are safe to eat and how frequently certain fish can be eaten varies. Site-specific information on safe fish consumption for local lakes and rivers is available from many state health departments. If you have Internet access, fish consumption information can be found at [www.epa.gov/waterscience/fish](http://www.epa.gov/waterscience/fish).

Over the years, questions have been raised about metal dental fillings, which contain 50 percent solid mercury. Thus far, no link has been made between metal dental fillings and changes in the central nervous system. Mercury in metal dental fillings doesn’t decompose, but research and debate continues among scientists and health officials over what — if any — effect mercury that might be given off from metal dental fillings might have on health.

Excessive contact with mercury can impair kidney function and cause permanent brain damage and radical changes in personality.

**Arsenic and no lace**

Arsenic is tasteless and odorless, making it the perfect poison for a murder mystery story. In real life, you’re more likely to encounter it in pesticides and herbicides used in gardening. Check the ingredients on these products, and carefully follow instructions.

Up until recently, arsenic could be found in much of the pressure-treated lumber on the market. Pressure-treated wood has been infused since the 1940s with a chemical preservative that included arsenic. As a result, the majority of wood used in outdoor settings, such as decks and play sets, was treated with this preservative.

But, by the end of 2003 and with the help of the Environmental Protection Agency, pesticide manufacturers voluntarily phased out using arsenic as a wood preservative in lumber to be used in the home or in children’s play areas.

However, if you work with wood and use older treated lumber, take precautions to avoid inhaling sawdust. Wear a dust mask and work outdoors for good ventilation. And wear gloves when working with older treated lumber.

Sudden, large exposure to arsenic can result in stomach pain, nausea, anemia, vomiting and diarrhea.

**Alternative treatments**

Interest in complementary and alternative treatments has grown over the years. One result is the seemingly endless number of shelves displaying unregulated products. In addition, there are a vast number of cyberstores on the Internet selling herbal and medicinal products.

The Food and Drug Administration isn’t authorized to regulate the safety or effectiveness of herbal products. With that in mind, it’s a buyer-beware market when it comes to homeopathic, herbal, and complementary and alternative remedies because some may include heavy metals.

It’s best to proceed with caution if you’re considering the use of alternative remedies. You may find it helpful to discuss their use beforehand with your doctor.
Losing weight, keeping it off

Successful strategies

Have you ever known someone who lost weight and kept it off? Have you wondered how they did it? Have you ever thought to ask?

That's exactly what a team of researchers decided to do when they created the National Weight Control Registry in 1994. Using newspaper and magazine advertisements, researchers gradually recruited a pool of American adults who had lost at least 30 pounds and had maintained the loss for at least a year.

Then, using an initial battery of questions and annual follow-up surveys, participants were asked how they lost the weight — and how they maintained the weight loss.

The participants

Among the roughly 5,000 participants, the average weight loss was about 72 pounds. Although many gained back some of that weight, all of the registry participants maintained at least a 30-pound loss — some for a decade or more.

The registry isn’t a random sample of the population, and study facilitators recognize that is a weakness of the research. Among the registry participants at the time of the study, the average age was roughly 47 and:

- 95 percent were white
- 82 percent had at least some college education
- 77 percent were women
- 64 percent were married

Regardless of demographics, weight loss doesn't come easily. About half the participants reported being overweight as a youth, and 75 percent reported obesity in one or both parents. The vast majority had tried to lose weight in the past and had failed.

Four strategies that worked

A consistent theme of the habits of registry participants is that there was no single strategy that worked — and was used — 100 percent of the time. About half reported receiving some kind of help through a weight-loss program, or from a doctor or nutritionist. The other half lost the weight on their own.

However, four key strategies emerged that were, in one way or another, employed by the vast majority of people. These include:

- **Eating a low-fat, low-calorie diet** — There were a variety of ways that people achieved this, although few people used extreme strategies. Strategies included restricting certain foods, limiting quantities, counting calories, counting fat grams, using a liquid formula or using an exchange diet. Whatever the method, 99 percent of participants somehow reduced overall caloric intake.

- **Getting high levels of physical activity** — Over 90 percent of participants incorporated physical activity into their weight-loss plan. The average exercise expenditure was equivalent to about one hour of brisk walking every day. Walking was the most common activity. However, many people participated in additional activities, such as weightlifting, bicycling or aerobics.

- **Eating breakfast** — Nearly 80 percent of the participants reported eating breakfast every day. Cereal and fruit were two of the more common breakfast foods consumed. Only 4 percent of participants reported never eating breakfast.

- **Frequent weighing** — Seventy-five percent of participants weighed themselves at least once a week. And, about 60 percent of those people weighed themselves every day.

Maintaining the gains

So how did registry participants keep weight off? Basically, by maintaining the behavior changes that allowed them to lose weight in the first place. Two primary factors that emerged as predictors of successful weight-loss maintenance were:

- **Day-to-day consistency** — Those who had a fairly consistent diet on weekdays, weekends and on holidays were most likely to keep from regaining weight.

- **Catching "slips"** — Among people who regained weight, those who recognized small weight regain early and got back on track were most likely to be able to stop or reverse the weight gains.

Regardless of difficulty, when people maintained weight loss for at least two years, they reduced the risk of regaining weight by 50 percent. In contrast, the more weight that participants regained before one year had passed, the less likely they were to be able to maintain their initial weight-loss amount.

Drawing conclusions

Observing the habits of the registry participants doesn’t prove that these habits are essential to successful weight loss. And it doesn’t mean that employing these habits is easy or that they will automatically lead you to lose weight.

Indeed, any set of weight-loss techniques is only as good as your motivation to use it — in both the short and long term. Registry researchers have found that most participants began to change their lifestyles after some sort of motivational trigger, such as a health concern or reaching an all-time high weight. But motivation may be difficult to foster in people who aren’t yet ready to change or in those who have met with repeated weight-loss failure in the past.

At the core of almost any plan are both commitment and motivation to adopt a lifestyle that consistently includes eating a healthy, low-calorie diet and getting plenty of physical activity.
**Bladder reconstruction**

**Rebuilding a urinary tract**

Invasive bladder cancer. It's the main reason people might have to have their urinary bladder partially or fully removed. In many cases, bladder removal (cystectomy) is the best option for prolonging life and providing a possible cure.

Still, even when bladder cancer is successfully eradicated, the problem remains — how will you eliminate urine without a bladder?

**Replacing your bladder**

During a cystectomy, your surgeon begins to fashion a route for urine elimination shortly after your bladder, and often other tissues, are removed. For older adults, the two main options for constructing a new urinary tract include making a:

- **Neobladder** — This replacement option is preferred by some because it most closely approximates normal bladder function. The neobladder is constructed by using about 20 inches of your small intestine, which along with its blood vessels, is used to fashion a pouch to serve as a bladder replacement.

  The tubes (ureters) that drained urine from your kidneys to your old bladder are attached to the top of the new bladder. Then the tube (urethra) that drains urine out of your body is attached to the bottom of the new bladder.

  Although the procedure allows you to urinate through the normal route, the nerves that normally regulate urination are not attached to your new bladder to signal fullness or to direct the muscles involved in normal urination. Instead, you'll need to urinate at regular intervals by flexing your abdominal muscles in a certain way.

  Most people are able to remain continent during the day and at night with a neobladder. However, nighttime leaking is more common than daytime leaking for various reasons. In the long term, fewer than 10 percent of people need to use self-catheterization as a means of removing urine with this procedure.

- **Urinary conduit** — In this procedure, a small piece of intestine is used to connect your ureters to an opening (stoma) in your abdomen. A small bag is attached to the outside of your body, covering the stoma, and urine drains into it as it's produced by your kidneys. You empty the bag several times a day. In the evening, you can use a larger bag that allows you to sleep through the night.

  One of the biggest sources of complications and prolonged recovery with cystectomy isn’t from the removal of the bladder, but from the cutting of intestine to form a new route for urine elimination.

  The majority of people who have their bladder replaced don’t experience bowel complications. However, removing a bowel segment puts you at risk of:

  - Slow recovery of the bowel after surgery
  - Leaking where the intestine ends are reconnected
  - Bowel obstruction, or the development of scar tissue that pinches the bowel, both of which may require additional surgery
  - Problems absorbing nutrients through your remaining intestines
  - Diarrhea, which usually goes away with time

**Tissue-engineered bladders**

It sounds far-fetched, but a team of researchers recently published the first study on using laboratory-grown bladders in humans. The researchers began their procedure by extracting certain cells from the bladders of youngsters with poorly functioning bladders due to a congenital problem. Over the course of about eight weeks, they coaxed these cells to multiply into a sphere of bladder tissue supported by a small, biodegradable scaffold.

The new bladders were implanted into the youngsters and, after about four years of follow-up, were shown to be about as effective as the standard neobladder procedure without the complications associated with using part of the bowel for reconstruction.

Still, there are a number of hurdles to overcome before this technology might be applied to adults who have had their bladders removed because of bladder cancer. And there’s still no way to attach sensory nerves around the tissue-engineered bladder to signal fullness or to orchestrate urination.

Tissue-engineered bladders are still likely to be a decade or more away from widespread use, but they may someday hold the key to restoring bladder function. Until then, the neobladder procedure likely will remain the gold standard of bladder replacement.
Questions and our answers

Q: I started to have an itchy outer ear about the same time that I got my new hearing aid. What could be the cause?

A: Assuming that you don’t have an outer ear infection, there are several possible causes.

It could be a case of contact dermatitis. This is a rash that’s a skin reaction to something you’ve had contact with — either irritating your skin or causing an allergic reaction.

It could be that the warm, possibly moist environment created by having a hearing aid in your ear all day is causing irritation. This is more likely to occur if you perspire heavily. Keeping your hearing aid clean and dry may solve the problem.

An allergic rash can be caused by just about anything that touches your ear, including shampoo, earrings, earplugs — or even hearing aids. Fortunately, hypoallergenic hearing aids are available that are less likely to cause this reaction if it’s related to your hearing aids.

A number of other skin conditions — such as eczema, psoriasis, seborrheic dermatitis or acne — could also be the cause of your itchy ear, especially if you have outbreaks of these conditions elsewhere on your head and neck. When these problems occur in your ear, they’re often treated in a similar way as when they occur in other places.

Whatever the cause, an evaluation by your doctor is warranted. Treatments vary, but topical steroid creams or drops are often used in the short term to relieve itching. Keep in mind that scratching your ear can damage skin in the ear canal, leading to infection.

Q: My state recently lowered the legal blood alcohol content limit for driving to 0.08 percent. How many drinks does it take to reach that limit?

A: That depends on a number of things. Factors such as your weight, age, and whether you’re male or female come into play. Also of importance is whether alcohol consumption occurs along with eating or on an empty stomach and how short or long the time frame is in which the alcohol is consumed.

Here’s what the National Highway Traffic Safety Administration says it generally takes to reach a blood alcohol content of 0.08:

- The average 170-pound man would have to consume more than four 12-ounce beers in one hour on an empty stomach.

- The average 137-pound woman would have to consume more than three 12-ounce beers in one hour on an empty stomach.

However, the body processes alcohol less efficiently with age, so it takes fewer drinks to become intoxicated, and the effects of alcohol last longer. Because alcohol is metabolized more slowly with age, sipping alcoholic beverages over an extended time period can also result in elevated blood alcohol content. In addition, definite impairment in driving skills may occur even when blood alcohol levels are only half the legal limit.

For people who choose to drink and are not evidently at risk of alcoholism, the National Institute on Alcohol Abuse and Alcoholism recommends that women and anyone over age 65 have no more than one drink a day. Men who are 65 and younger should have no more than two drinks a day.

A standard drink size takes into account the amount of alcohol in one drink. Four to 5 ounces of wine is considered one drink. Twelve ounces of beer counts as one drink. And 1 to 1.5 ounces of 80-proof distilled spirits is a single drink.

But, while 0.08 is the legal limit for driving, keep in mind that any amount of alcohol may impair your reaction time. If you’re going to drink, have a designated driver.

Have a question or comment? We appreciate every letter sent to Second Opinion but cannot publish an answer to each question or respond to requests for consultation on individual medical conditions. Editorial comments can be directed to: Managing Editor, Mayo Clinic Health Letter, 200 First St. S.W., Rochester, MN 55905, or send e-mail to HealthLetter@Mayo.edu

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