Low blood pressure
Not always smooth sailing

Working together with individuals, families and medical professionals to offer support and information on syncope and reflex anoxic seizures

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Glossary of terms

**Autonomic nervous system** Part of your nervous system that controls involuntary functions of the body such as heartbeat and breathing

**Blood pressure** Recordings consist of two numbers. The top reading is systolic blood pressure and relates to the contraction of the left side of the heart. The bottom number is the diastolic recording and is the lowest pressure achieved in the circulation

**Cardiomyopathy** Is a disease of the heart muscle which may cause thickening, thinning and weakness or replacement of muscle with fibrous tissue or fat

**Hypotension** Also known as low blood pressure. This is when the systolic recording is less than 90mmHg

**Orthostatic** Relates to standing upright

**Postprandial hypotension** When blood pressure falls as a consequence of eating food

**Postural tachycardia syndrome (PoTS)** An abnormal response by the autonomic nervous system when changing to an upright position. It is defined as a persistent increase in heart rate of over 30 beats per minute when standing upright

**Reflex anoxic seizures (RAS)** A type of fit which results from a brief stoppage of the heart through excessive activity of the vagus nerve

**Syncope** A blackout that is caused by a sudden lack of blood supply to the brain

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You may find yourself in London, or San Francisco, or perhaps Freiburg, and there is a good chance you will encounter some fog. Now imagine that you are walking around in a fog — figuratively — every single day. You have an annoying sense of lightheadedness just getting out of bed in the morning. Standing in line at the supermarket makes your head swim, and you can barely figure out how to get home. Exercise is out of the question, because it makes you feel like you’re going to pass out. Even sitting at work is a struggle because half the time you cannot think straight. Your friends think you are not paying attention, but you find it hard to focus even when you are having fun on a night out. It is like your brain is out on leave, and you’re hoping someday it will get back to work. You go to your doctor for some answers, and all he can say is,

“You’re fine. Nothing at all is the matter. Why, you don’t even have high blood pressure!”

“What is my blood pressure?” you ask.

“It’s nice and low. About 95/60. It’s the lowest one I’ve seen all day.”

“Then why don’t I feel right?”

“Well, maybe it’s anxiety. I can give you a pill for that.”
You may actually decide to get another medical opinion, and it is not uncommon for people with these sort of vague symptoms to see multiple specialists and still have no answers. Patients, especially women, may be labelled as being hysterical, having ‘chronic fatigue syndrome,’ or just being told that there is nothing wrong.

Many doctors won’t take you seriously if they don’t find anything tangible on a physical examination, and often will suggest you see a psychiatrist. Even worse is coming across a practitioner who orders a battery of expensive blood tests looking for some mysterious malady, chronic infection, or some obscure ‘vitamin deficiency’ for which only he or she has the cure. No one wants to admit that perhaps your symptoms are due to your blood pressure being too low.

A blood pressure primer

What is blood pressure and how do we measure it? It is the pressure of the blood in the arteries, which are the vessels that carry the blood away from the heart. Blood pressure is usually measured with an inflatable cuff around the arm and expressed as two numbers... the higher number is known as the systolic (si-stol-ik) pressure and the lower number is the diastolic (dahy-uh-stol-ik) pressure. They are expressed as one number ‘over’ the other, like ‘120 over 80’ but written with a slash separating the two numbers. The systolic pressure is the highest pressure within the arteries when the heart is contracting, while the diastolic pressure is the lowest pressure in the arteries when the heart is relaxed and getting ready to squeeze again.

How high is a ‘normal’ blood pressure? Well, that depends. Most children and adolescents feel perfectly fine walking around with a blood pressure in the range of 90/50. Most doctors start to pay attention only if the numbers are too high, because they are primarily concerned with excessively high blood pressure or
'hypertension,' a common medical condition that can lead to serious complications such as heart attack, stroke, kidney disease, vascular damage, and a host of other problems. Hypertension often occurs without symptoms, so early detection relies on measuring blood pressure on routine medical visits.

Medical studies established decades ago that blood pressures greater than 140/90 are associated with an increase in these long-term complications, and anything higher will often prompt the doctor to recommend some form of intervention. Most commonly, a low-salt diet, optimizing weight, and regular exercise are the first steps to treat hypertension before initiating medications. A high salt intake is known to worsen hypertension, and water pills or diuretics, which eliminate salt and water, can successfully treat some hypertensive patients.

These recommendations are so commonplace in a medical practice that most doctors, nurses, nutritionists, and even authors of books and articles have pushed the notion that salt is bad for you because it will cause hypertension. This advice has filtered down to grade school health classes, where children first learn to stay away from salty foods if they want to remain healthy.

Although most clinicians are comfortable with diagnosing hypertension, the definition of an abnormally low blood pressure is less well defined. No one really knows what blood pressure is ‘too low’ for a particular individual, so it is sometimes difficult to point to a low blood pressure and lay the blame on it. Some people can walk around with systolic blood pressures in the 90s and feel perfectly fine, while that blood pressure may make other people feel unwell. The medical term for low blood pressure is ‘hypotension’. To understand why low blood pressure causes symptoms, you must understand how the blood gets to where it needs to go.
Delivering the goods

Blood carries oxygen and nutrients to all of the organs of the body. Under normal circumstances, the organ that takes priority over all others is the brain. Brain cells fire extremely rapidly as they talk to each other. In order for the cells to function properly they require a constant stream of blood to deliver adequate ‘fuel’, which is used to generate sufficient energy to carry on these complex cellular tasks. In fact, the brain is so dependent on having a continuous supply of blood that if the blood flow is cut off for as little as five or six seconds a person will immediately lose consciousness. One of the physiological challenges we face as humans is that we need our blood to flow uphill in order to reach the control tower sitting atop the vertically oriented architecture of our body.

Ever since early man started walking on two legs, our cardiovascular system had to become capable of providing enough pressure to push the blood against the force of gravity and provide for the needs of the brain cells. The heart generally does a fine job, and most people can go through life without ever having cerebral (brain) blood flow problems. However, there is a number of factors that influence the blood pressure, and any one can cause the blood pressure to become low. One factor is the overall health of the heart muscle. Some people have underlying heart disease that affects the strength of contraction of the muscle. The heart muscle may be weakened by a heart attack, which leaves a scar on the heart and reduces its pumping ability.

Sometimes the heart is weakened because of a condition known as cardiomyopathy. In some people, the heart is able to pump well, but the blood cannot move through the heart chambers properly because of a valve problem.
The valves in the heart function to keep the blood flowing in the proper
direction. Old age and other conditions can affect these heart valves and either
prevent them from opening properly or cause them to leak. Either way, the
efficiency of the heart’s contraction may be reduced. If the heart is not able to
squeeze or eject the blood properly, low blood pressure may result.

The other common cause of low blood pressure is inadequate filling of the heart.
This is a concept that most people do not appreciate. The heart is a pump that
squeezes 60 to 70 times a minute on average, at rest. In between squeezes the
heart has to relax and fill up again. The filling of the heart occurs from the veins
that bring blood back to the heart, and that blood flow is known as ‘venous
return’. If filling of the heart is inadequate, then the heart will only be partially
filled when it contracts, resulting in only a small amount of blood being available
to pump out.

Reduced filling of the heart has a direct effect to reduce the total amount of
blood being pumped, and this often causes hypotension. Many things can
reduce filling, including dehydration, anemia, or blood loss. Also, since the
blood in the lower part of the body has to travel uphill to get back to the heart,
anything that restricts the upward flow of blood back to the heart will adversely
affect cardiac filling. For example, this can happen in pregnant women,
when the weight of the uterus presses on the main vein in the abdomen and
decreases the amount of blood flowing back to the heart. Certain medications
can affect the blood volume or the venous return and cause low blood pressure
by reducing cardiac filling.
Gravity: our worst enemy

Most people do not realize that the cardiovascular system can hold an enormous amount of blood. The miles and miles of arteries, veins and capillaries (60,000 miles/100,000 km if they were laid out end to end!) can actually hold about five times the volume of blood that we normally carry around with us. A normal adult will have about 5-6 liters of blood in their cardiovascular system, but that amount of blood can easily fit in the stretchy blood vessels found in our abdominal cavity alone. Our brain is in charge of making sure that the blood goes to where it needs to go. But gravity has a significant influence on the distribution of blood throughout our body. When we are lying down, gravity does not affect the blood very much, but when we stand up, a portion of our blood is pulled down into the lower part of our body. This reduces venous return significantly, and the blood pressure can fall up to 20 points just within a few seconds. Luckily, if everything is working normally, our brain is able to detect this shift in blood and very quickly activates special reflexes that constrict certain blood vessels, helping to normalize blood pressure and adapt to the change in posture. All of this usually happens within 15-30 seconds.

If those brain reflexes are a little sluggish, people can experience lightheadedness due to a condition known as ‘orthostatic hypotension’, which simply means that the blood pressure drops excessively in response to a change in position. Orthostatic hypotension can be immediate or it can take several minutes to occur. It can be mild and cause the subtle sort of symptoms described in the beginning of this article, but if the drop in blood pressure is severe it can result in fainting. People with this type of hypotension feel much better when they are lying down. This condition can be diagnosed by carefully measuring the blood pressure in different positions. Sometimes a more formal standing test is done using a tilting table. A tilt table test is designed to detect abnormal changes in blood pressure and heart rate when a person is placed in an upright position, and can be helpful in diagnosing an excessively low blood pressure.
The autonomic nervous system

In some patients, a mild degree of hypotension is present all of the time, not just when they are standing. It may be that the blood pressure control system in their brain is not functioning properly. The blood pressure and the heart rate are controlled by the part of the brain just above where it connects with the spinal cord, an area known as the brainstem. The special brain circuitry that controls all of our bodily functions is found in the brainstem. This circuitry is part of the ‘autonomic nervous system’ and works like the brain’s autopilot, controlling things like heart rate, blood pressure, sweating, intestinal activity, the size of the pupils in our eyes, and other functions that we do not have to think about.

Many of these brain circuits work like the thermostat in your home. If your home is too cold, the thermostat turns on your furnace, and when the room reaches the proper temperature the thermostat turns off the furnace. The brain is supposed to regulate your blood pressure like the thermostat regulates the temperature of your home, keeping it appropriate for whatever activity you are involved with. Obviously, your blood pressure should be higher if you are exercising or standing up, and can be lower if you are resting or lying down. In some people, the blood pressure control reflexes might be set wrong, or your brain does not respond properly to a low blood pressure because of abnormal function of the autonomic nervous system. This disorder is sometimes referred to as ‘dysautonomia’ (dis-aw-tuh-noh-mee-uh).
Changes in blood pressure

Depending on circumstances, the blood pressure varies from one minute to the next. The body needs to adapt and deal with blood pressure changes that can occur with sudden changes in position or activity. Since the brain is enclosed within a fixed space of the cranium (our skull), it is unable to expand much. So if the blood pressure gets too high there has to be a mechanism to prevent the brain from getting injured. This mechanism is handled by the blood vessels supplying the brain.

Whenever the blood pressure starts to rise, those blood vessels immediately constrict – they squeeze down to provide a resistance to blood flow, in essence regulating exactly how much blood reaches our brain at any one time. This happens automatically, and the scientific term for it is ‘cerebral autoregulation’. Just as the blood vessels constrict if the pressure increases, they are also able to relax and dilate if the blood pressure drops. By relaxing, the resistance to flow is decreased and the blood finds it easier to make the trip uphill. Thus, our body is designed to provide a fairly constant flow of blood to the brain over a wide range of blood pressures, generally from systolic pressures as low as 70 up to perhaps 250. At the edges of that range, the system begins to fail.

On the low end, blood pressures below 80 can cause symptoms in most people because of a drop in cerebral blood flow, and below 70 or so can cause severe symptoms such as fainting or even convulsions. Some people may have a problem with their autoregulation mechanism. If this system doesn’t work properly, ‘low normal’ blood pressures in the 90s or even above 100 may still cause symptoms. If the blood vessels do not constrict sufficiently, flow to the brain tissue can be reduced, thereby causing symptoms of low blood flow. Even a slight reduction in blood flow can affect the more sensitive areas of the brain.
So-called ‘higher centers’, where logic and comprehension are located, are very sensitive to blood flow. Even a slight reduction in cerebral blood flow to those areas can lead to a dulling of one’s mental faculties, something known as ‘cognitive dysfunction’. This is what people often describe as ‘brain fog’, where problem solving, arithmetical abilities, and even memories can be affected.

Disturbances in cerebral blood flow autoregulation can be one of the most difficult conditions to diagnose since it requires specialized equipment that may only be found in special research facilities.

Evaluating low blood pressure

Patients who are suspected of having symptomatic hypotension should search for physicians who specialize in blood pressure abnormalities, dizziness, and fainting conditions. Unfortunately, general practitioners may not appreciate this diagnosis and have been known to prescribe medication for other conditions that can make matters worse.

Pediatricians often blame lightheadedness and fainting in teenagers on growth spurts, and these young patients may wind up having significant difficulties in school because of the symptoms related to a low blood pressure.

Hypotension may be a result of a variety of disorders such as an underactive pituitary or adrenal glands, kidney problems, thyroid issues, anemia, and many others. A thorough medical evaluation is clearly indicated. Many people are successfully diagnosed by cardiologists and cardiac electrophysiologists with experience in evaluating this condition. Some neurologists are comfortable diagnosing dysautonomia in patients with hypotension, though it is a good idea to also have a cardiac specialist involved.
Patients should have a complete cardiac evaluation to make sure that there is no structural reason for a low blood pressure (like a weak heart muscle or a valvular problem), and people with questionable symptoms may benefit from a 24-hour blood pressure monitor or a tilt table test.

**Treatment**

Treatment strategies vary widely, depending on the severity of the symptoms and the cause of the low blood pressure. In young patients, the treatment is often taking extra salt in the diet. Salt is a necessary nutrient and is not necessarily bad for everyone, despite all the advice we read in the media. Young patients with hypotension should drink plenty of fluids (at least 2 to 3 liters every day) and take as much as 8-10 grams of salt in their diet to increase the blood pressure to levels in the range of 110-120. This is often enough to eliminate all symptoms and restore a normal sense of well-being. In patients who continue to run a low blood pressure despite adequate fluid intake and a high salt diet, medications can be used to increase the blood pressure.

These medications should be prescribed by a physician who is comfortable with treating this condition and should be used cautiously, since the blood pressure may become too high as a result. Patients with hypotension often benefit from regular exercise (swimming is excellent because the water pressure on the legs improves venous return). Most of the time, exercises are best done in a sitting position to minimize lightheadedness, so a recumbent bicycle or rowing machine are ideal to improve cardiovascular wellness. In fact, many patients with hypotension feel so poorly that they become physically deconditioned, which only worsens the symptoms. A program of regular aerobic exercise may help, but it could take a month or two before you notice a difference.
Helpful hints

If you have low blood pressure, you should try to avoid warm environments, particularly hot showers, saunas, or hot tubs. The heat causes an increase in blood flow to the skin, essentially pulling blood away from the central circulation and making the symptoms of low blood pressure worse. For similar reasons, large meals can worsen symptoms because of an increase in blood flow to the stomach and intestine.

Avoid sudden changes in position... when getting out of bed, sit on the edge of the bed for 15-30 seconds to allow your brain to adapt to the effect of gravity. Compression hose (preferably thigh-high or waist-high) can make a big difference in symptoms in people who have to stand for long periods of time. Sleeping with your head elevated can reduce the production of urine while you are asleep, which helps avoid waking up in a dehydrated state – people with low blood pressure often feel their worst when they first get out of bed in the morning.

Above all, you want to avoid fainting/losing consciousness if your blood pressure gets too low. Signs of an impending fainting spell include severe lightheadedness, nausea, feeling hot or sweaty, or lightening/darkening/blurring of the vision. If those symptoms occur, immediately LIE DOWN FLAT and elevate your legs. This is the quickest way to increase blood flow to the brain and prevent loss of consciousness and resulting injury. If you absolutely cannot lie down, you can squat down or try to tense your arm and leg muscles. Try to drink a large amount of fluid (at least 16 ounces) as quickly as possible, as this can rapidly increase the blood pressure. You should obtain additional advice and counseling from a specialist who regularly treats patients with fainting and autonomic dysfunction.
Know Your Pulse

What is your pulse?

Your pulse is:
♥ Your heart beat  ♥ Your heart rate  ♥ Your heart rhythm

One of the easiest places to feel your pulse is on your wrist, just below your thumb. You can feel your pulse in other areas of your body, including the crease of your elbow, in your groin or behind your knee.

Why and when should you check your pulse?

Being aware of your pulse is important because it may indicate an abnormal heart rate or rhythm.

It is a good idea to try taking your pulse at various points throughout the day (before and after various activities). Your pulse rate will change during the day depending on what activity you are doing. This is normal. To get your baseline pulse and normal rhythm, try taking your resting pulse when you wake in the morning and before going to bed.

What is a normal pulse?

Between 60 and 100 beats per minute.

However, there are normal reasons why your pulse may be slower or faster. This may be due to your age, medications, caffeine, level of fitness, any other illness including heart conditions, stress and anxiety.

When should you seek further advice?

♥ If your pulse seems to be racing some or most of the time and you are feeling unwell.
♥ If your pulse seems to be slow some or most of the time and you are feeling unwell.
♥ If your pulse feels irregular (“jumping around”), even if you do not feel unwell.

Everyone is different and it is difficult to give precise guidelines. Certainly many people may have pulse rates over 100 beats/min (bpm) and less than 60 bpm. Irregularity is quite difficult to assess since the normal pulse is a bit irregular, varying with the phase of respiration. You should see your doctor if you have a persistent heart rate above 120 bpm or below 40 bpm.

STARS
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Please remember these are general guidelines and individuals should always discuss their condition with their own doctor.
Your **Pulse** in four steps

1. To assess your *resting* pulse rate in your wrist, sit down for **5 minutes** beforehand. Remember that any stimulants taken before the reading will affect the rate (such as caffeine or nicotine). You will need a watch or clock with a second hand.

2. Take off your watch and hold your left or right hand out with your palm facing up and your elbow slightly bent.

3. With your other hand, place your index and middle fingers on your wrist, at the base of your thumb. Your fingers should sit between the bone on the edge of your wrist and the stringy tendon attached to your thumb (as shown in the image). You may need to move your fingers around a little to find the pulse. Keep firm pressure on your wrist with your fingers in order to feel your pulse.

4. Count for **30 seconds**, and multiply by 2 to get your heart rate in beats per minute.

   If your heart rhythm is irregular, you should count for **1 minute** and do not multiply.

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**Record your pulse here**

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Please remember that this publication provides general guidelines only. Individuals should always discuss their condition with a healthcare professional.

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