

Doc, I Am Dizzy!

A Neurologist Explains What You
Must Know About Dizziness

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Introduction

The word dizziness can mean several things, depending on the experience of the person who is dizzy:

- lightheadedness
- spinning
- being off balance
- a sensation of the surroundings being in motion
- a tendency to fall over

In this book we will identify and explain the many ways in which people experience dizziness. We will analyze these situations and use the logic and reasoning of doctors to determine the cause.

We will also explore the treatment options that your doctor may have available.

This book assumes that you, the reader, are an intelligent person who is curious about the nature of dizziness. It assumes that the reader is not out to sue authors and it does not try to hedge everything in a lawyerly manner. It makes an attempt to explain the logic and reasoning that a doctor uses when evaluating someone with dizziness. It tries to explain the possibilities a doctor might consider in a given scenario of dizziness, as well as the testing he might provide and the treatment options he may offer.

The goal of this book is to improve your knowledge of the extremely common neurological symptoms of dizziness. In this new and amazing era of medical care, where patients have to wait 3 months to see a doctor, it is critically important that you know at least as much about your body as you know about your car or the electrical system in your house.

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1.

I am so unsteady,
I would never pass
a drunk driver test.

What's happening?

Suppose you feel unsteady—you are not lightheaded or spinning, but you simply feel off balance, as if you could fall down anytime. Unsteadiness is one of the often overlooked and ignored symptoms, especially in the elderly, although being unsteady is not always a sign of ‘growing old.’

When you say, “I am dizzy,” it’s critically important to have a clear description of what exactly you mean by dizziness. When you tell your doctor that you are feeling off balance, and you feel that you would never pass a drunk driver test, your doctor needs to know exactly what you mean. Is it a sensation of lightheadedness? Is it a spinning sensation? Is it more of a loss of balance? Is it a sensation of everything moving around or just a weird indescribable feeling?

In this first chapter, we will look at the complex, contextual process by which a doctor evaluates a person who feels dizzy, unsteady, spinning, lightheaded, and so on. In the following chapters, we will look at specific symptoms and combinations of symptoms that a doctor may discover with proper diagnosis.

What is it?

Several reasons for this “unsteady” feeling will be discussed below. These include **neuropathy, ataxia, parkinsonism, spinal cord damage**, and others. To understand how balance and coordination work, we have to understand that our balance when walking depends on a number of things. One of these factors is the visual input that the brain gets from the eyes orienting you to what is around you and where you are. The second item is the information that comes from the legs through the nerves, which tells the brain, again, where are you in space, and where are you in relation to your surroundings. The third item is the information that comes from the inner ear telling the brain where are you? How are you oriented in your environment? Are you facing up, down, or sideways? All that information is necessary for the brain to get its bearings.

Now, if any one of these sensory inputs is damaged or impaired or compromised in any way, this leads to a sensation of dizziness, unsteadiness, or a lack of equilibrium.

What will my doctor do?

Suppose you have a loss of feeling in the legs. Are you losing the ability to sense hot and cold sensations in your feet and legs? If you are in the hot shower, do you feel the heat in your legs, or they are kind of numb? If you have any loss of feeling in the legs, you can test this by touching your feet with a cold object such as an ice cube, then compare and contrast how well you feel the same cold sensation on your thigh, tummy, or chest. If you notice there's loss of feeling in the legs (as compared to other parts of your body), you may have a condition called **neuropathy**.

A word of caution here. Loss of feeling in the legs can be caused by a lot of different things. Neuropathy is just one of them. Sometimes damage to the spinal cord can lead to loss of sensation in the legs, affecting your balance. The brain does not get enough information as to where your body or legs are located, and this leads to sensation of dizziness or loss of equilibrium. It is not lightheadedness or spinning, but a feeling of being off balance. This loss of balance worsens in the dark or when you close your eyes. The reason is simple. Like I said earlier, your body's balance depends on proper input from your eyes, your ears and the nerves in your legs, and if one of these is defective, your balance is disturbed. If more than one of these modalities is affected, it changes your balance badly enough to make you fall down.

If you or a loved one has neuropathy, bad eyesight, and inner ear problems, the combination can be extremely

dangerous, with a high chance of falls and injury. The resulting head injury may make the problems worse.

What else is an important factor in balance? In the back of the brain, there's a place called the cerebellum (the *kleinhirn* or 'little brain'). The cerebellum is the part of the brain that has everything to do with coordination. Anything that damages the cerebellum affects balance. Damage could be from a stroke, toxins, or genetic conditions that lead to shrinkage or atrophy of the cerebellum. Alcohol is a common reason for damage to this part of the brain. All of these things can lead to lack of coordination. A person with damage to the cerebellum, depending on the extent of the damage, has something called ataxia, which doctors look for when they examine you. Generally, the doctor will ask you to use your index finger to touch your nose and to go back and forth between touching your nose and the doctor's finger. Or he may ask you to take the heel of one foot and glide it up and down the shin of the other leg. He may ask you to stand up with your feet together. In some types of ataxia, the person may just fall over (the doctor usually anticipates this and stops the fall).

The doctor will also check your inner ear function, also known as vestibular function. The head impulse test is a test in which the doctor will ask you to keep your eyes fixed on his nose while he moves your head from side to side. This is to see if your eyes are able to keep up with these movements.

If there is damage to the inner ear or vestibular apparatus, the ability of the eyes to keep steadily fixed on the

target (while the head is moving) will be impaired. This test gives your doctor important information about your inner ear. There is a condition called **bilateral vestibulopathy** where the vestibular apparatus (inner ear) on both sides is damaged, causing you to feel off balance whenever you are walking, especially on uneven ground or in dim light, but it feels better if you stand still.

Your doctor will also check the strength in your legs. Now why is this important in someone who is off balance? Sometimes what is perceived as unsteadiness may simply be weakness of the legs. Your doctor will determine if your legs are strong enough to conduct mundane activities. Are you able to get up from a chair without holding onto things? Obviously, if the legs are weak, your balance will be off. Because weakness of the legs can be caused by a number of factors, the doctor would investigate this further.

Your doctor will also assess your muscle tone and your **postural stability**. It is possible to have normal sensation in your legs, normal hearing, normal eyesight, normal strength, normal coordination, and normal blood pressure but still be off balance. How so? Welcome to the world of **parkinsonism**.

Parkinsonism is a condition of stiffness or rigidity of the muscles, as well as overall slowness of movements and loss of balance. In a person with postural instability, falls are common, especially when turning. The person feels off balance, which sometimes may be perceived as dizziness. Even a slight push may lead to a fall, and indeed this is exactly

how the doctor will test you for postural instability. He would ask you to put your feet together and stand still, and then he would give a gentle shove to see if you topple over. (Do not worry—he will not let you fall.)

Now, is your lack of balance or dizziness more a case of lightheadedness? If so, is the lightheadedness the same when you're standing, sitting, and lying down, or is it more prominent when you're standing up? If it is lightheadedness that is prominent upon standing up, it may be due to a problem with the blood pressure or the heart rate, which your doctor would check with simple blood pressure and heart rate measurements while lying down, sitting up, and standing positions. This sequence is called orthostatic blood pressure measurements and is typically done 3 minutes apart. The cause of lightheadedness can also be scientifically investigated with the more sophisticated tilt table test.

Overall, the analysis of loss of balance or unsteadiness is very complex and requires looking at several different aspects of your neurological function, all of which have to be working and intact for you to have normal balance. To summarize, a general sense of loss of balance (without lightheadedness or spinning sensation) can be due to:

- impairment of the vestibular apparatus or inner ear
- loss of sensation in the legs weakness of the legs
- cerebellar damage leading to loss of coordination
- damage the spinal cord with a loss of sensation
- parkinsonism

Depending on what the doctor finds on examining you, he will decide on further testing. If the doctor finds a loss of feeling or strength in the legs, he may order a test called nerve conduction studies and electrography to determine whether there is nerve or muscle disease. If the loss of feeling in the legs extends to the tummy or chest, he may instead look into spinal cord disease using a magnetic resonance imaging (MRI) scan. If he finds signs of ataxia, he may order an MRI to look the cerebellum. If he finds signs of vestibular (inner ear) injury on both sides, he may order a test called a rotatory chair test. If he suspects that your heart rate or blood pressure is changing with changes in body position, he may order a tilt table test. If he feels that you have parkinsonian findings, he may order a dopamine transporter (DAT) scan which checks the metabolic patterns in the brain.

Can it be treated?

Each condition causing unsteadiness or dizziness has its own treatment and prognosis, as indicated in the detailed sections below.

Tell me more about neuropathy.

Neuropathy is a condition that occurs when there is damage to the peripheral nerves, which are responsible for transmitting signals between the brain and the rest of the

body. There are various causes of neuropathy, with some of the most common ones being:

1. **Diabetes:** Diabetic neuropathy is one of the most common forms of neuropathy and occurs as a result of high blood sugar levels damaging the nerves over time. It typically affects the nerves in the feet and legs, causing symptoms such as numbness, tingling, and pain.
2. **Trauma or injury:** Physical trauma, such as a car accident or sports injury, can damage the nerves and lead to neuropathy. Compression or entrapment of nerves, such as in carpal tunnel syndrome, can also result in nerve damage and symptoms of neuropathy.
3. **Autoimmune disorders:** Conditions like rheumatoid arthritis, lupus, and Guillain-Barre syndrome can trigger the immune system to attack the body's own nerves, leading to neuropathy.
4. **Vitamin deficiencies:** Deficiencies in vitamins such as B12, B6, and E can cause nerve damage and result in neuropathy symptoms. These vitamins play crucial roles in nerve function and health.
5. **Infections:** Certain infections, such as Lyme disease, shingles, HIV/AIDS, and hepatitis C, can cause nerve damage and lead to neuropathy. The infections may directly affect the nerves or trigger an inflammatory response that damages the nerves.

6. **Toxins and medications:** Exposure to toxins like heavy metals, chemicals, or certain medications (such as chemotherapy drugs) can result in nerve damage and neuropathy. Chemotherapy-induced peripheral neuropathy is a common side effect of many cancer treatments.
7. **Genetic factors:** In some cases, neuropathy can be inherited due to genetic mutations that affect nerve function. Conditions like Charcot-Marie-Tooth (CMT) disease are examples of genetic neuropathies.
8. **Other health conditions:** Certain health conditions, such as kidney disease, liver disease, hypothyroidism, and cancer, can also contribute to nerve damage and neuropathy.

It is important to consult with a healthcare provider for a thorough evaluation and diagnosis if you are experiencing symptoms of neuropathy. Treatment approaches may vary depending on the underlying cause of the condition.

A Nerve Conduction Study + Electromyography.

A nerve conduction study (NCS) and electromyography (EMG) are two different but related tests that are often done together to help diagnose nerve and muscle disorders. Here is an overview of what is involved in each test:

1. **Nerve Conduction Study (NCS):** Involves placing electrodes on the skin over the nerves being tested. Small electric shocks are applied to the nerves, and the response is recorded. This test measures how well electrical signals are conducted along the nerves and can help evaluate nerve damage or conditions like carpal tunnel syndrome, peripheral neuropathy, or nerve compression. Generally, the test is not painful but may cause some mild discomfort or tingling.
2. **Electromyography (EMG):** Involves inserting thin needles into the muscle being tested. The needles detect the electrical activity of the muscles at rest and during contraction. This test evaluates the health of muscles and the nerve cells controlling them, and can help diagnose conditions like muscle disorders, nerve disorders, or injuries. Most people find the needle insertion slightly uncomfortable but not overly painful.

Overall, both NCS and EMG are safe procedures that provide valuable information to healthcare providers about the function of nerves and muscles in the body. The tests are often used together to give a comprehensive assessment of neuromuscular health.

Tell me more about ataxia.

Ataxia is a neurological disorder characterized by a lack of coordination that affects muscle movements, including

walking, speech, and eye movements. It is caused by damage to the cerebellum or its connecting pathway within the brain. The cerebellum is responsible for coordinating voluntary movements and maintaining balance.

There are different types of ataxia, including hereditary ataxia (such as Friedreich's ataxia), acquired ataxia (resulting from conditions like stroke or multiple sclerosis), and idiopathic late-onset cerebellar ataxia (where the cause is unknown).

Symptoms of ataxia may include unsteady walking (gait ataxia), difficulty with fine motor skills like buttoning a shirt or writing (limb ataxia), slurred speech (dysarthria), involuntary eye movements (nystagmus), and tremors.

Individuals with ataxia may also experience muscle weakness, fatigue, and problems with swallowing. Diagnosis of ataxia involves a thorough neurological examination, imaging tests such as an MRI to assess the brain structure, genetic testing in the case of hereditary ataxia, and blood tests to rule out other potential causes.

Treatment for ataxia focuses on managing symptoms and improving quality of life. This may include physical therapy to improve balance and coordination, speech therapy for communication difficulties, assistive devices to aid mobility, and medications to control symptoms like tremors.

Living with ataxia can be challenging, but with proper management and support, individuals with ataxia can lead

fulfilling lives. Support groups and counseling can also be beneficial for both patients and their caregivers in coping with the challenges of ataxia.

Tell me more about parkinsonism.

Parkinsonism is general term for a group of conditions that includes Parkinson's disease. The main symptoms of parkinsonism include tremors, muscle rigidity, bradykinesia (slowness of movement), and postural instability. Parkinsonism can be caused by several underlying conditions, including:

1. **Parkinson's disease:** This is the most common cause of parkinsonism. It is a progressive neurodegenerative disorder that affects dopamine-producing neurons in the brain. The loss of these neurons leads to an imbalance in the neurotransmitters involved in controlling movement, resulting in the characteristic symptoms of parkinsonism.
2. **Drug-induced parkinsonism:** Certain medications, such as antipsychotics, antiemetics, and calcium channel blockers, can cause parkinsonism as a side effect. The use of these drugs can interfere with dopamine function in the brain and lead to movement abnormalities.
3. **Vascular parkinsonism:** This type of parkinsonism is caused by multiple small strokes in the brain that

disrupt the pathways involved in movement control. The damage to these brain regions can result in symptoms similar to Parkinson's disease.

4. **Toxins:** Exposure to certain environmental toxins, such as manganese or carbon monoxide, can damage the brain cells involved in movement control and lead to parkinsonism.
5. **Progressive supranuclear palsy (PSP) and multiple system atrophy (MSA):** These are rare neurodegenerative disorders that can also cause parkinsonism due to degeneration of specific brain regions.

The diagnosis of parkinsonism is based on a thorough medical history, physical examination, and often additional tests such as brain imaging (MRI or CT scan) or laboratory tests. Treatment typically involves medications that help to restore dopamine balance in the brain, such as levodopa and dopamine agonists. In some cases, physical therapy, speech therapy, and occupational therapy may also be recommended to help manage the symptoms of parkinsonism.

It is important for individuals with parkinsonism to work closely with their healthcare providers to develop a comprehensive treatment plan tailored to their specific needs and symptoms. Early detection and appropriate management can help improve quality of life and slow disease progression in individuals with parkinsonism.

Nutritional Deficiencies Leading to Spinal Cord Damage.

Nutritional deficiencies that can lead to spinal cord degeneration include:

1. **Vitamin B12 deficiency:** Lack of vitamin B12 can cause damage to the nerve fibers in the spinal cord, leading to a condition known as subacute combined degeneration.
2. **Vitamin E deficiency:** Inadequate intake of vitamin E can result in nerve damage and degeneration, including in the spinal cord.
3. **Vitamin D deficiency:** Low levels of vitamin D can impair the absorption of calcium, which is essential for maintaining the health of the spinal cord and nerve function.
4. **Copper deficiency:** Copper is important for the formation of myelin sheath, a protective covering of nerves, including those in the spinal cord. A deficiency in copper can lead to demyelination and degeneration of nerve fibers.
5. **Vitamin B1 (thiamine) deficiency:** Thiamine is essential for proper nerve function, and a deficiency can lead to neurological symptoms, including damage to the spinal cord.

2.

I feel dizzy when I stand up.

What's happening?

Almost everyone has felt a sudden dizziness when standing up at least once. This is a form of dizziness that may happen often. You might be sitting down watching TV or engaged in another activity, and when you stand up suddenly, you feel lightheaded. Before you know it, you are lying on the floor. You may even require an emergency room visit from fracturing a hip or injuring yourself.

When you injure yourself by falling, the attention turns to the injury itself. Oftentimes, the neurological cause of your fall goes undetected.

What is it?

In medicine, there are always multiple factors to consider, so there may be different reasons that you feel

dizzy when you stand up. The most likely cause is **orthostatic hypotension** a decrease in blood pressure when standing up. The question becomes: what is causing your blood pressure to drop suddenly?

There may be other conditions at play, including **postural orthostatic tachycardia syndrome (POTS)** or **neurocardiogenic syncope**. These conditions will be explained in detail below.

Tell me more about this type of dizziness.

A slight drop in blood pressure is normal, but if it decreases significantly, it can cause dizziness or loss of consciousness. This can also cause changes in heart rate. Your heart rate may slow significantly, causing you either to faint or to feel lightheaded. When you get up and feel dizzy, the initial step is to monitor for any changes in blood pressure.

What will my doctor do?

When you explain to your doctor that you feel dizzy standing up, they will likely test you in one of three ways. One common approach involves checking blood pressure after lying down for three minutes, then taking another measurement after sitting up for three minutes, followed by a final measurement standing up three minutes later. Thus,

blood pressure is checked in three positions: lying down, sitting up, and standing up, with three minutes between each measurement.

Another type of test involves checking the blood pressure every minute. The initial measurement is taken while the individual is lying down. Next, blood pressure is checked every minute for five minutes while sitting up. Then the five-minute procedure is repeated while standing.

A third type of test is the tilt table test. When ordered by your doctor, the tilt table test can detect conditions such as orthostatic hypotension, neurocardiogenic syncope, and POTS syndrome. During a tilt table test, the patient lies on a special table that can be moved to a vertical, upright position. The test is commonly used to evaluate conditions such as unexplained fainting, lightheadedness, and low blood pressure.

Blood pressure is measured using a blood pressure monitor, which measures the pressure in your arteries when your heart contracts (systolic, the upper number) and between beats (diastolic, the lower number). If the upper number decreases by 20, or the lower number decreases by 10 during the test, it is considered a significant drop in blood pressure.

In general, diagnosing orthostatic hypotension is straightforward when actively testing for it. The important thing is to assess blood pressure in various positions to observe the changes.

Procedure for a tilt table test.

The tilt table test helps healthcare providers assess how the body regulates blood pressure and heart rate in response to changes in position. The results of the test can provide valuable information for diagnosing and managing conditions that affect blood flow and can guide appropriate treatment strategies.

1. **Preparation:** The patient is securely strapped to the tilt table to prevent falls or injury during the test. Heart rate, blood pressure, and sometimes blood oxygen levels are monitored throughout the procedure.
2. **Tilt phase:** The table is slowly tilted upwards, causing the patient to go from a lying down position to an upright position. This change in position can help provoke symptoms such as dizziness, lightheadedness, or fainting, which might be indicative of certain heart or nervous system conditions.
3. **Observation and symptom provocation:** The patient's responses to the change in position are closely observed by medical personnel. Symptoms such as dizziness, lightheadedness, sweating, nausea, or fainting may be recorded.
4. **Recovery:** If the patient experiences symptoms such as fainting, the table is quickly returned to a horizontal position to help normalize blood flow and prevent injury. The patient is then monitored until symptoms resolve and vital signs stabilize.

Can it be treated?

In general, diagnosing orthostatic hypotension is straightforward when actively testing for it. The important thing is to assess blood pressure in various positions to observe the changes. The good thing about this type of dizziness is that it is usually straightforward to treat.

Attimes, blood pressure may decrease due to dehydration or a lack of fluids in the body, especially when using diuretics or experiencing diarrhea or vomiting. Treatment may involve addressing the underlying cause, managing medications, increasing fluids and salt intake, and implementing lifestyle modifications to improve blood pressure regulation.

A commonly used and simple method for treating it involves wearing special stockings that put pressure on the legs, aiding in venous return—the upward flow of blood from the legs that helps to regulate overall blood pressure. In some cases, this method may be ineffective, leading doctors to consider using alternate solutions, such as medications, to regulate blood pressure changes upon sitting up or standing up. The goal is to reduce the risk of fainting, feeling dizzy, falling, or any of the potential injuries from falling down.

What if I want to be sure it's not something more serious?

Other times, a feeling of lightheadedness may be a symptom or result of another condition. This kind of vertigo

is commonly observed in individuals with diabetes, thyroid issues, or certain neurological disorders like Parkinson's disease. Lightheadedness may also occur if you have been inactive for a long time due to illness.

Tell me more about orthostatic hypotension.

Also known as postural hypotension, this is a drop in blood pressure that occurs when a person stands up from a sitting or lying down position. The cause involves various processes in the body that normally help maintain blood pressure when changing positions.

Your autonomic nervous system, which, like it sounds, is a network of nerves that controls involuntary bodily functions, such as heart rate, blood pressure, and vessel constriction. The autonomic nervous system should be able to adjust quickly to maintain blood pressure when you stand up. For example, baroreceptors in the vessels send signals to the brain when blood pressure changes. In response, your brain will signal the blood vessels to constrict, or it might tell your heart to pump more blood to maintain adequate flow. When this fails to respond accordingly, blood flow to the brain may be compromised, causing dizziness. It may also be caused by blood pooling in the lower extremities due to gravity. These issues can lead to symptoms such as dizziness, lightheadedness, and fainting.

Tell me more about POTS.

Postural orthostatic tachycardia syndrome (POTS) is a condition that affects blood flow and circulation in the body, leading to symptoms such as rapid heartbeat, lightheadedness, fainting, and fatigue. People with POTS typically experience a significant increase in heart rate upon standing up, which can cause dizziness and other uncomfortable symptoms. This condition is often seen in young adults, particularly women, and can have a significant impact on daily life.

Diagnosis and treatment for POTS may involve lifestyle modifications, medications, and other interventions to help manage symptoms and improve quality of life.

Tell me more about neurocardiogenic syncope.

Neurocardiogenic syncope, also known as vasovagal syncope, is a common form of fainting that occurs due to a sudden drop in blood pressure and heart rate. Like orthostatic hypotension, the mechanism of neurocardiogenic syncope involves a complex interplay between the autonomic nervous system and cardiovascular system.

Unlike orthostatic hypotension, however, syncope is typically triggered by a stressful or emotionally overwhelming situation, such as seeing blood, standing for a long period, or experiencing intense pain or fear.

The best treatment is to lie down. Gravity helps to improve blood flow to the brain, which helps to restore consciousness. The parasympathetic nervous system activity decreases, and the sympathetic nervous system becomes more active, helping to increase heart rate and blood pressure to normalize blood flow.

3.

I feel like I am constantly on a boat.

What's happening?

One of the most unusual types of dizziness we encounter is when you experience a continuous sensation of movement. This often occurs after a long vacation, such as a cruise or boating trip, during which you feel fine.

You are not feeling dizzy, you are enjoying yourself, and all is well. After disembarking from the cruise ship, it may feel like you are always moving. You feel as if you are still aboard the ship. Normally, while the ship is moving, your brain adjusts to the undulating motion of the ship, where the ship as a whole is moving. Once you are off the ship, your brain seems to struggle to readjust.

What is it?

This condition has an unusual name. It is known as **Mal de Débarquement (MdDS)**. It is also known as disembarkment sickness.

Tell me more about this type of dizziness.

Mal de Débarquement usually occurs after a trip lasting at least four hours. You feel like everything is moving, rocking, and swaying. Even though you are safely on land, it still feels like you are on the ship. It is not clear what exactly causes it. The sensation is a non-spinning vertigo with a continuous rocking, bobbing, or swaying feeling. It starts within 48 hours of your trip and continues longer than 48 hours after your trip.

One theory suggests that the brain may continue to process information even after the rocking and swaying movements of the ship or boat has ceased. While the condition is rare, it may persist for as much as a year.

Mal de Débarquement is more prevalent among women. The cause is unclear. It is unlikely to occur in children or individuals who are postmenopausal. Do hormones play a role in this? We don't know. We do know it is not a psychological condition, even if your doctor believes that your symptoms may be caused by psychological factors.

What will my doctor do?

Mal de Débarquement is a diagnosis of exclusion. If you visit the doctor for unsteadiness after a trip, they will first check for and rule out any serious and concerning conditions before confirming the diagnosis of MdDS. It is not a diagnosis that doctors make hastily. The good news is that the majority of individuals with this condition will gradually improve, but

it is impossible to predict whether this improvement will happen in days, months, or years.

Can it be treated?

To treat MdDS, doctors have attempted to use vestibular rehabilitation, a type of physical therapy. Some people find it effective, but there is no guarantee that it will work.

A type of medication that can be effective for some individuals is benzodiazepines, like Valium (diazepam) or Klonopin (clonazepam). However, these may not work for everyone, and it is not even clear as to why or how they work. One possibility is that it acts as a vestibular suppressant and sedative.

Is MdDS related to sea sickness?

Sea sickness, also known as motion sickness, is a common condition that occurs when there is a conflict in the sensory systems responsible for balance and spatial orientation. The exact mechanism of sea sickness is not fully understood, but it is believed to be caused by sensory conflict between the signals received by the eyes, inner ear (vestibular system), and muscles and joints (proprioceptive receptors) in the body.

The difference between sea or motion sickness and MdDS is where it occurs. Motion sickness occurs during travel, such as on a rocking ship or in a bumpy car ride. MdDS occurs *after* the trip, when you are on stable ground.

When a person is on a moving vessel, such as a boat or ship, the motion disrupts the body's usual sense of balance. For example, when the boat rocks back and forth, the vestibular system senses the movement, but the visual system may not detect the motion because the surroundings also move in sync with the boat. This mismatch between sensory inputs creates confusion in the brain, leading to symptoms of sea sickness. As a result of this sensory conflict, the brain may interpret the perceived motion as a potential threat to the body's stability. This triggers a series of physiological responses, such as increased heart rate, sweating, nausea, and dizziness, which are characteristic symptoms of sea sickness.

Furthermore, the brain's attempt to reconcile the conflicting sensory information puts a strain on the central nervous system, leading to further discomfort and symptoms associated with motion sickness. It is important to note that not everyone is equally susceptible to sea sickness, as individual differences in sensory processing, previous experiences with motion, and genetic factors may influence a person's susceptibility.

How can I manage sea sickness or motion sickness?

To manage sea sickness, individuals can try various strategies such as focusing on the horizon, maintaining

proper hydration, avoiding heavy meals, and using medications or wearable devices designed to alleviate motion sickness symptoms. Consulting with a healthcare provider or a motion sickness specialist can also provide tailored recommendations for prevention and management strategies based on individual needs.

Another question people ask is whether there is any medication to prevent getting sick. There is no evidence to suggest that any particular medication is effective. Will it make a difference in reducing stress levels before the trip? Evidence indicates it doesn't have a significant impact. The location on the ship or the type of cabin do not make a difference, either. Fortunately, not everyone experiences motion sickness; unfortunately, this makes it difficult to do effective studies.

Is MdDS related to land sickness?

Land sickness is a condition that occurs after prolonged exposure to motion, such as a cruise or airplane travel. The exact mechanism of land sickness is not fully understood, but researchers believe it is related to sensory mismatch between the visual, vestibular (balance), and proprioceptive (body position) systems. The difference between MdDS and land sickness is its duration and severity. Land sickness is short-term unsteadiness and usually happens immediately after landing or disembarking.

When an individual is on a moving vehicle like a boat or plane, their vestibular system and other sensory systems adjust to the constant motion. However, when the individual returns to land, these systems must readjust to the stable environment. In some cases, this adjustment process doesn't happen smoothly, leading to the symptoms of land sickness. The brain receives conflicting signals from the different sensory systems, causing sensations of imbalance, dizziness, vertigo, and swaying. This sensory mismatch can persist for hours, days, or even weeks after the person has returned to solid ground. It is believed that the brain continues to adapt and recalibrate to the stable environment, which can lead to the ongoing symptoms of land sickness.

Additionally, other factors such as stress, fatigue, and individual susceptibility may also play a role in the development and persistence of land sickness.

Treatment for land sickness typically involves rest, hydration, and sometimes medications to alleviate symptoms. Further research is needed to fully understand the underlying mechanisms of land sickness and develop more effective treatments for this condition.

Tell me more about Mal de Débarquement.

Mal de Débarquement Syndrome (MdDS) is a rare neurological disorder characterized by a persistent sensation

of rocking, swaying, or bobbing that occurs after a period of being on a moving platform such as a boat or airplane.

The exact mechanism of MdDS is not fully understood, but several theories have been proposed to explain its development. One prominent theory suggests that MdDS is related to maladaptation of the vestibular system, which is responsible for maintaining balance and spatial orientation.

When a person is exposed to prolonged motion, such as during a boat or plane ride, the vestibular system adapts to the motion by generating compensatory signals to maintain stability.

However, when the motion stops, the vestibular system may continue to generate these signals, leading to a mismatch between the perceived motion and actual motion of the body. This mismatch is thought to be the underlying cause of the symptoms experienced in MdDS.

Another theory proposes that MdDS may be related to dysfunction in the brain's sensory integration processes, particularly involving the processing of signals from the vestibular system and other sensory systems such as vision and proprioception. Disruption in the coordination of these sensory inputs could lead to the persistent sensation of motion that characterizes MdDS. Additionally, recent research has also suggested that changes in brain connectivity and activity patterns may play a role in the development of MdDS. Functional brain imaging studies have revealed alterations in the activity of regions involved in processing sensory

information and regulating balance, indicating a potential neurobiological basis for the disorder.

While the exact mechanism of MdDS remains to be fully explained, ongoing research efforts are aimed at uncovering the underlying neurophysiological processes involved in this condition.

Treatment approaches for MdDS typically focus on symptom management through a combination of medications, vestibular rehabilitation therapy, and psychotherapy aimed at addressing the psychological impact of the disorder.

4.

I can't shake off this dizzy feeling after the flu.

What's happening?

If you recently had the flu, a cold, or an upper respiratory infection, you may feel dizziness caused by an infection in the inner ear. You may also feel deafness on the side of the infection as a result of inflammation. Your dizziness may be severe, and you may feel like you are spinning around. Most individuals also experience intense nausea and vomiting.

What is it?

The section of the inner ear that affects balance is known as the labyrinth. Thus, the condition is called **labyrinthitis**.

Tell me more about this type of dizziness.

The severe nature of the condition, and how scary it is when you experience dizziness and partial deafness in one ear, can be distressing. Upper respiratory viruses are often the culprit. The labyrinth of the inner ear is affected by **a bacterial or viral infection**, which creates a severe vertigo or spinning sensation, hearing loss, and ringing in the ear.

Labyrinthitis can also occur if there is **an infection in your middle ear**, which can happen with or without an upper respiratory infection. Middle ear infection has the potential to impact the inner ear as well. Therefore, if there is a middle ear infection, it can lead to labyrinthitis due to its proximity to the inner ear. This can cause symptoms such as intense dizziness, hearing loss, severe nausea, and vomiting. It does not necessarily mean the infection (from the bacteria) spreads to the inner ear, but the close proximity of a bacterial infection sets up an inflammatory reaction in the inner ear. However, if there is a defect in the structures that separate the middle and inner ear, the bacterial infection can directly spread to the inner ear.

Labyrinthitis may also be caused by **a small stroke** that affects the small blood vessel leading to the labyrinth, but this typically does not happen in cases of upper respiratory infection. It can happen spontaneously, although it is not very common.

The condition can also occur as a result of some **autoimmune disorders**. People with autoimmune disorders may have a response in which the body's immune system mistakenly targets and attacks its own cells, believing them to be foreign invaders. An autoimmune response can cause or intensify inflammation in the inner ear, contributing to labyrinthitis symptoms.

In cases where bacteria directly invade the inner ear and cause infection, the labyrinth can be affected, leading to symptoms of dizziness. This is something that happens in the dangerous condition called **meningitis** which usually also includes headache, fever, and other symptoms.

What will my doctor do?

In most cases, labyrinthitis improves within a few days. Doctors typically treat labyrinthitis with meclizine, or they might use steroids. Some doctors prescribe antiviral medications or antibiotics if there is an infection in the middle ear.

If things don't improve within a few days, a doctor will likely conduct further tests to ensure that there are no other causes. Those tests may look for slurred speech, double vision, trouble coordinating arms or legs, or difficulty swallowing, which could indicate another issue is at play. They may decide to perform a brain scan to look for problems such as a stroke. A stroke is a serious neurological

condition in which a blood clot blocks the flow of blood in a vessel, causing permanent damage to the part of the brain supplied by that vessel.

Can it be treated?

For the majority of individuals, if your doctor diagnoses you with a bacterial middle ear infection and also notes that you are experiencing vertigo, nausea, and vomiting, then they will probably prescribe oral antibiotics for treatment. In the case of a viral infection, antibiotics don't work, so treatment focuses on managing symptoms and allowing the body to recover.

Hospitalization is generally not required for labyrinthitis. However, if the vomiting is severe and causing dehydration, the patient might require intravenous fluids. In some cases, the doctor may determine that a different course of treatment is necessary based on the overall situation.

In most cases, damage to the inner ear will improve within a few weeks as the body fights off the infection and inflammation subsides. However, in some cases, the illness may cause enough damage to the inner ear that the symptoms last for years. In that situation, it would be referred to as chronic labyrinthitis, where the individual usually requires vestibular rehabilitation. This type of labyrinthitis can be very debilitating, preventing the person from gainful employment.

Tell me more about Guillain-Barre syndrome.

The autonomic variant of Guillain-Barre syndrome (GBS) is a rare subtype of Guillain-Barre syndrome that specifically affects the autonomic nervous system. The autonomic nervous system is responsible for regulating involuntary bodily functions such as heart rate, blood pressure, digestion, and bladder control. When this system is affected in GBS, it can lead to a unique set of symptoms that may not be present in other forms of the syndrome.

- Orthostatic hypotension
- Cardiac arrhythmia
- Bladder and bowel dysfunction
- Sweating abnormalities
- Temperature regulation issues

Diagnosis of the autonomic variant of GBS typically involves a thorough clinical evaluation by a doctor, along with tests such as nerve conduction studies, electromyography, autonomic function tests, and blood tests to assess for specific antibodies associated with GBS.

Treatment of this subtype of GBS involves managing symptoms and providing supportive care to address the effects of autonomic dysfunction. Due to the potential complications associated with autonomic dysfunction, individuals with the autonomic variant of GBS may require close monitoring in a hospital setting, where they can receive

specialized care from a multidisciplinary team, including neurologists, intensivists, and rehabilitation professionals. Physical therapy and other rehabilitation interventions may also be recommended to help individuals regain strength and function as they recover from GBS. It is important for patients with the autonomic variant of GBS to work closely with their healthcare providers to address their specific symptoms and manage the potential challenges associated with autonomic dysfunction. Long-term outcomes for individuals with this subtype of GBS can vary, but many patients do experience improvement over time with appropriate treatment and support.

There is a variant of Guillain-Barre syndrome selectively attacking the autonomic nervous system that is hard to diagnose. The autonomic nervous system is what regulates your blood pressure and heart rate. When this critical system is hit, it can lead to severe intractable dizziness. In this type of dizziness, the mere act of standing up causes severe dizziness because of a sudden drop in the blood pressure or heart rate. Effective treatment is available, but only if your doctor considers this possibility.

Tell me more about labyrinthine stroke.

A labyrinthine stroke, also known as labyrinthine infarction, is a rare and serious condition that affects the inner ear. The inner ear is responsible for controlling balance and spatial orientation. When a stroke occurs in the blood

vessels supplying the inner ear, it can lead to a disruption in these functions.

The symptoms of a labyrinthine stroke can be similar to those of other types of strokes, such as sudden dizziness, vertigo, loss of balance, nausea, vomiting, hearing loss, and difficulty walking. However, due to the unique location of the stroke in the inner ear, labyrinthine strokes can also cause specific symptoms related to balance and spatial orientation.

Diagnosis of a labyrinthine stroke usually involves a physical examination by a healthcare provider, along with imaging tests such as CT scans or MRIs to confirm the location and extent of the damage.

Treatment for labyrinthine strokes typically involves managing the underlying cause of the stroke, such as controlling blood pressure or addressing issues related to blood clotting.

Recovery from a labyrinthine stroke can vary depending on the extent of the damage and the underlying cause. Some individuals may experience a significant improvement in symptoms over time with appropriate treatment and rehabilitation, while others may have long-term balance and coordination issues.

It is important for individuals who experience symptoms of a labyrinthine stroke to seek immediate medical attention. Early diagnosis and treatment can help improve outcomes and reduce the risk of long-term complications. Rehabilitation

therapy, including physical therapy and balance training, may also be recommended to help individuals regain their balance and improve their quality of life after a labyrinthine stroke.

Overall, a labyrinthine stroke is a rare but serious condition that can have significant implications for an individual's balance and spatial orientation. With prompt medical attention and appropriate treatment, individuals affected by a labyrinthine stroke can improve their symptoms and work towards recovery.

Tell me more about Ramsay Hunt syndrome.

In another scenario, if, along with the dizziness and hearing loss, you also experience weakness on one side of the face, it could be **Ramsay Hunt syndrome**, which is caused by *Varicella zoster*, the same virus responsible for chickenpox. Typically, individuals with this condition may also develop a rash on or around their ear. This requires treatment with antiviral medications.

5.

I get this spinning dizziness out of nowhere.

What's happening?

You were doing just fine, then all of a sudden, a severe spinning dizziness hit you out of nowhere. But your hearing is fine, and you don't have a headache.

What is it?

You may have **vestibular neuronitis** (or neuritis), which is an inflammatory process in the nerve that goes to your inner ear. This can occur with almost any upper respiratory infection, including the flu. If you have a cold sore on your face, the herpes simplex virus that causes cold sores can sometimes lead to this condition. Other viruses, like cytomegalovirus (CMV), can also cause this.

Tell me more about this type of dizziness.

Vestibular neuronitis is among the most common causes of a sudden, intense spinning sensation that persists for over a day. It is a condition that affects the inner ear and can lead to sudden feelings of vertigo, dizziness, and balance problems. It is caused by inflammation of the vestibular nerve, which is responsible for transmitting signals from the inner ear to the brain to help maintain balance and orientation.

Symptoms of vestibular neuronitis usually come on suddenly and can be quite severe. Patients may experience a spinning sensation (vertigo), feelings of lightheadedness or dizziness, nausea, vomiting, and problems with coordination and balance.

These symptoms can be triggered or worsened by head movements or changes in body position. The exact cause of vestibular neuronitis is not always clear, but it is thought to be related to a viral infection, such as the herpes simplex virus. In some cases, it may also be linked to inflammation of the vestibular nerve due to conditions like labyrinthitis or other inner ear disorders.

What will my doctor do?

When you experience sudden dizziness, your doctor will consider various potential causes, not just issues related to

the inner ear. For instance, he may consider a stroke when there is a new, constant spinning feeling.

If there is damage to the vestibular nerve on one side, the doctor may observe that your eyes are twitching when you look towards the unaffected side. Later, the direction of these twitching movements changes and tends to go more towards the dizzy side.

When examining you, the doctor may perform a bedside test called a head impulse test. During this test, the doctor will gently and quickly move your head from side to side to check for any issues with the eyes' ability to adjust properly when the head is moved. He will ask you to focus on his nose while he moves your head. Normally, your eyes would remain fixed on his nose without moving. However, if there is damage to the vestibular nerve on one side, your eyes may struggle to remain steady. On the damaged side, you may not be able to keep your eyes fixed on his nose, and instead the eyes may simply drift off target. Doctors might use this and other tests to determine if there is any damage to your vestibular nerve or to the labyrinth. The doctor will also pay attention to any other abnormalities, such as a weakness in the arms or legs, changes in speech or balance, headaches, or a problem with your inner ear or nerves. If they have a significant concern, they will order a brain scan. MRI scans are ideal; however, in most emergency rooms, an MRI will not be an option. Instead your doctor may request a CT scan to look for things that require urgent intervention. An MRI scan can be done after you are admitted.

Can it be treated?

Treatment for vestibular neuronitis focuses on managing symptoms and helping the patient recover their balance and coordination. This may include medications to reduce dizziness and nausea, vestibular rehabilitation therapy to retrain the brain to adjust to the changes in the inner ear, and lifestyle modifications to avoid triggers that worsen symptoms.

Most individuals with vestibular neuronitis experience significant improvement in their symptoms over a few weeks to months, although some may have lingering issues with balance or sensitivity to head movements. In rare cases, vestibular neuronitis can lead to long-term complications such as persistent vertigo or chronic imbalance.

If your doctor determines you have vestibular neuritis, he may prescribe corticosteroids, antiemetics, or vestibular suppressants in the early stages. He may also prescribe antibiotics if he thinks the infection is bacterial. Other treatments may include anti-nausea medications, anti-inflammatories, or vestibular rehabilitation therapy. If the doctor determines your condition is more severe, he may take other action including requesting a CT scan or MRI.

6.

I have horrendous headaches that make me dizzy.

What's happening?

If you are suddenly experiencing a severe headache, a spinning sensation, with or without nausea and vomiting, it could be one of several harmless or life-threatening conditions. Diagnosing the precise cause depends on the context and the “big picture.” This is where algorithms fail, and the health care provider’s experience and good judgment make all the difference.

What is it?

If your dizziness comes with a severe headache, nausea, and vomiting, odds are it is a **vertebrobasilar** or **ischemic**

stroke affecting the back of the brain. Blood supply to a part of the brain is damaged or bleeding inside the brain. In either case, this can be a potentially very dangerous situation that needs immediate emergency care.

However, sometimes the cause is less dangerous. A person with a long history of migraines can also present with a combination of headache and dizziness. These are called vertebrobasilar or basilar migraines. A common symptom of these migraines is double vision; others may include slurred speech, ringing in the ears, a lack of coordination, confusion, tingling and numbness on both sides of the body, and vague impairment of vision in both eyes. Some of these events can be provoked by stress or sleep deprivation, alcohol, or even changes in the weather.

Basilar migraines are more common in people in their twenties or thirties. Women who get basilar migraines should avoid any kind of medication that contains estrogen. (Avoid estrogen-containing medications and smoking when a migraine has an aura component to it, no matter which type of migraine you have.)

These migraines last from five to sixty minutes. If longer than an hour, it might be something more ominous.

Tell me more about this type of dizziness.

Vertebrobasilar migraine, also known as migrainous vertigo, is a type of migraine headache that is believed to be

caused by abnormal functioning of the blood vessels supplying the base of the brain, known as the vertebrobasilar system. The vertebrobasilar system includes the vertebral arteries and the basilar artery, which are crucial for supplying blood to the brainstem, cerebellum, and other vital areas of the brain. Individuals with vertebrobasilar migraine may experience a range of symptoms that can be quite debilitating.

These symptoms often include severe headaches that typically occur at the back of the head or neck and may be accompanied by dizziness, vertigo (a sensation of spinning), imbalance, nausea, vomiting, and visual disturbances. Some people may also experience difficulty speaking, ringing in the ears (tinnitus), or hear a whooshing sound in their ears. The exact cause of vertebrobasilar migraines is not fully understood, but researchers believe that abnormalities in the blood vessels of the vertebrobasilar system may lead to changes in blood flow and oxygen supply to the affected areas of the brain. Certain triggers, such as stress, hormonal fluctuations, lack of sleep, dehydration, or certain foods, may also contribute to the onset of vertebrobasilar migraines in susceptible individuals.

What will my doctor do?

It is essential for individuals experiencing symptoms of vertebrobasilar migraine to seek medical attention from a healthcare provider, preferably a neurologist or headache specialist, for a proper evaluation and management plan tailored to their specific needs.

Early detection and appropriate treatment can help improve quality of life and reduce the frequency and severity of vertebrobasilar migraine attacks. Diagnosis of vertebrobasilar migraine can be challenging as the symptoms can overlap with other conditions such as vestibular disorders, benign paroxysmal positional vertigo (BPPV), or other types of migraines. A thorough medical history, physical examination, and diagnostic tests such as magnetic resonance imaging (MRI) or computed tomography (CT) scans may be used to rule out other potential causes and confirm a diagnosis of vertebrobasilar migraine.

Can it be treated?

Treatment for vertebrobasilar migraine often involves a multidisciplinary approach, including lifestyle modifications, stress management techniques, dietary changes, and medications to help alleviate symptoms and prevent future attacks. Medications commonly used to treat vertebrobasilar migraine may include pain relievers, anti-nausea drugs, preventive medications, or medications to improve blood circulation.

Tell me more about the vertebrobasilar stroke.

A vertebrobasilar stroke, also known as a posterior circulation stroke, occurs when there is a disruption of

blood flow to the posterior part of the brain supplied by the vertebrobasilar arteries. These arteries stem from the two vertebral arteries that merge to form the basilar artery, which provides oxygenated blood to the lower and posterior parts of the brain, including the brainstem and cerebellum. When a vertebrobasilar stroke occurs, it can lead to a range of symptoms and complications due to the vital functions controlled by this area of the brain.

A vertebrobasilar stroke can also result in serious complications such as brainstem infarction, which can lead to respiratory failure or locked-in syndrome, a condition where the individual is conscious but unable to move or communicate except for eye movements.

The risk factors for a vertebrobasilar stroke are similar to those of ischemic strokes in general and may include high blood pressure, diabetes, high cholesterol, smoking, obesity, and a sedentary lifestyle. Prompt medical attention is crucial in the event of a suspected vertebrobasilar stroke to minimize brain damage and improve the chances of recovery.

Treatment may involve medications to dissolve blood clots, manage blood pressure, and prevent further strokes, as well as rehabilitation therapy to regain lost functions and improve quality of life.

7.

I woke up, sat up, and the world is spinning.

What's happening?

You wake up in the morning after an uneventful night, turn over in bed and sit up, and the whole world starts to spin violently. This can be frightening, especially when you are already running late for work.

What is it?

Severe spinning provoked by turning on your side can be due to a variety of different reasons, and when you see a doctor, the first thing your doctor will do is to rule out anything potentially serious, especially when the dizziness was of sudden onset. There is a benign type of dizziness which is triggered by head movements. This is a condition

called BBPV or **benign paroxysmal positional vertigo**. This is something that happens due to a problem with tiny particles, or otoliths, in the inner ear, and this causes a type of dizziness. This vertigo is remarkable in that it's characterized by severe spinning, but it's provoked by specific positions of the head. You may experience severe dizziness when you turn in bed on one side, or you look to one side or the other. There are a few features about this type of positional dizziness that tell us that it's likely to be something harmless. For example, a spinning sensation that lasts around a minute or so and is consistently provoked by some neck positions or head positions would point to benign paroxysmal positional vertigo.

Tell me more about this type of dizziness.

With the condition known as BPPV or benign paroxysmal positional vertigo, the person gets spells of dizziness lasting about a minute to a few minutes. It is provoked by turning the head. The spinning may then resolve for a while but come back again when the circumstances recur. If the dizziness is consistently brought on by certain positions of the head, this could very well be benign paroxysmal positional vertigo.

It is important to remember that all kinds of dizziness may worsen when moving. What is unique about BPPV is that the person is not dizzy in other positions. The dizziness is consistently provoked by specific head turning movements in specific directions. Typically, your doctor would do

some tests, one of which is something called a Dix Halpike maneuver, as well as a head impulse test. These tests will give him some information about whether it is due to the otoliths in the inner ear.

What will my doctor do?

One of the things that your doctor will worry about is whether this could be a stroke. Sometimes the physical exam itself may show signs of stroke. Sometimes a physical exam may not show clear cut signs of a stroke, especially if it's a small stroke, in which case only an MRI scan of the brain can tell him what exactly is happening.

One test, the head impulse test, is a diagnostic procedure used to assess the function of the vestibulo-ocular reflex (VOR). During the test, the patient is asked to fixate on a target while the examiner rapidly and unpredictably moves the patient's head to one side. The examiner observes the patient's eye movements to see if they can maintain visual fixation on the target (which would indicate a normal VOR response) or if there is a corrective saccade, or movement, of the eyes away from the target (which would indicate a VOR deficit). The test is often used to help diagnose conditions affecting the inner ear, such as vestibular neuronitis or acute unilateral peripheral vestibulopathy.

There are a lot of other factors at play, and as always in medicine, your doctor will be looking at the big picture

to rule out the worst possibilities first. Then he can look for more benign conditions such as the benign paroxysmal positional vertigo. Thus, your doctor might use the Dix-Hallpike maneuver, which is a diagnostic test used to identify BPPV.

Can it be treated?

BPPV has effective treatment measures available. Meclizine is a medication commonly used for dizziness. Meclizine has a calming effect on the labyrinth, which is the part of the inner ear involved in balance. They may also use a medication called ondansetron, which is anti-nausea / anti-vomiting medication, or they may use some other medication to counteract the vomiting tendency. With benign paroxysmal postal vertigo, there is a group of repositioning exercises that are widely used. These are also called the modified Epley maneuver. Your doctor will show you how to use those techniques, or your doctor may refer you to the physical therapist who will perform those maneuvers on you and also instruct you on how to do them at home. These exercises are a sequence of movements to move those tiny particles out of the way so that they don't inflict dizziness anymore.

These re-positioning maneuvers, however, involve neck movements at fairly extreme angles. When performing these repositioning exercises, be extremely careful in case the person has severe arthritis in the neck or the blood vessels in the neck are narrowed down, blocked, or partially blocked, or

if there is any cardiovascular instability. With this condition, these exercises may or may not help it go away.

Tell me more about BPPV.

Benign paroxysmal positional vertigo (BPPV) is a common inner ear disorder that can cause sudden and brief episodes of vertigo, which is a sensation of spinning or dizziness. BPPV is characterized by a brief, intense feeling of spinning or dizziness triggered by specific head movements or changes in position, such as rolling over in bed or looking up at the ceiling. The vertigo associated with BPPV usually lasts less than one minute. BPPV occurs when small calcium carbonate crystals called otoconia become dislodged from their usual position within the inner ear's balance organs and float into the fluid-filled canals of the inner ear. This displacement of the crystals interferes with the normal fluid movement within the inner ear, leading to confused signals being sent to the brain about the body's position in space and thus resulting in vertigo. Individuals with BPPV may also experience symptoms such as nausea, vomiting, unsteadiness, and loss of balance during episodes of vertigo.

BPPV is more common in individuals over the age of 60 but can affect people of all ages.

Diagnosing BPPV typically involves a physical examination, including specific head and body movements to trigger vertigo and nystagmus (involuntary eye movements).

In some cases, additional tests such as vestibular testing or imaging studies may be conducted to rule out other potential causes of vertigo.

Treatment for BPPV usually involves a series of specific head and body movements known as the Epley maneuver or canalith repositioning procedure, which is designed to move the dislodged calcium crystals out of the affected inner ear canal. This maneuver helps to alleviate symptoms of vertigo in many cases. In some instances, medications to help manage symptoms of nausea and dizziness may be prescribed.

Overall, BPPV is a manageable condition, and most individuals experience significant improvement in their symptoms with appropriate diagnosis and treatment. It is important to consult a healthcare professional for an accurate diagnosis and personalized treatment plan if you suspect you may be experiencing symptoms of BPPV.

What is the Dix-Hallpike Maneuver?

During this maneuver, the patient is seated upright on an examination table with their head turned to the side at a 45-degree angle. The healthcare provider then helps the patient smoothly and quickly lie down backwards with their head hanging over the edge of the table and turned to the opposite side.

As the patient is moved into this position, the healthcare provider carefully observes the patient for any characteristic

signs of nystagmus (involuntary eye movements) that may indicate BPPV. If the patient experiences spinning vertigo and nystagmus, it suggests that tiny calcium carbonate crystals in the inner ear may have become dislodged and are causing symptoms of vertigo when they move within the semicircular canals.

The Dix-Hallpike maneuver helps clinicians identify the specific canal involved in BPPV, allowing for targeted treatment maneuvers such as the Epley maneuver to relocate the crystals and alleviate symptoms of vertigo.

8.

I get dizzy spells when my ear feels stuffy and is ringing.

What's happening?

You are going about your day, when suddenly you have a spell of dizziness that feels like you are spinning around. One of your ears feels full or stuffy, and you can also hear a ringing sound in that ear.

What is it?

Meniere's disease is a disorder of the inner ear that is characterized by episodes of vertigo, hearing loss, tinnitus (ringing in the ear), and a feeling of fullness or pressure in the ear. The exact mechanism of Meniere's disease is not fully

understood, but it is believed to be caused by an increase in the volume and pressure of the fluid, or endolymph, in the inner ear.

This increase in fluid pressure can disrupt the balance of the inner ear, leading to the symptoms of vertigo and imbalance. It can also cause damage to the hair cells in the inner ear, resulting in hearing loss and tinnitus. Factors that may contribute to the development of Meniere's disease include genetics, immune system abnormalities, viral infections, and abnormalities in the blood vessels of the inner ear. Some patients who have Meniere's disease may also have a different type of presentation where they suddenly fall to the ground, as if someone pushed them over. They may even describe it as an invisible hand that knocks them over. They don't slump down—they act like somebody just threw them to the ground. It can be quite frightening because it can lead to injuries. This variant of Meniere's disease is called a Tumarkin otolithic crisis.

Tell me more about this type of dizziness.

Persons with Meniere's disease have this combination of a spinning sensation, stuffed feeling in the ear, and ringing in the ear. In Meniere's disease, the spells of dizziness have nothing to do with body position, which sets it apart from benign paroxysmal positional vertigo. The duration of the spinning sensation can vary in duration from around

20 minutes up to 24 hours. The combination of vertigo, ringing or buzzing in the ear, and a feeling of fullness in the ear can continue for days at a time. One fourth of patients with Meniere's disease will only present with the spinning sensation and the blocked feeling in the affected ear. The tinnitus may not be so evident in the beginning. Only one third of patients who have Meniere's disease show all three of the features in the beginning stages. Eventually, all of them will show all the features. Until all three features are present, Meniere's disease may not be correctly recognized.

Generally, Meniere's disease affects only one ear, but in a small percentage of persons both ears can be affected. Meniere's is more likely to occur in your forties, fifties, and sixties, but it can happen at other ages, too.

What will my doctor do?

As always, whenever there's a new symptom, your doctor is going to follow a process which is called differential diagnosis, which means considering all the different possibilities it could be before deciding what exactly it is. In this instance, we will need to look into all the conditions that can cause a spinning sensation. The doctor would consider other conditions such as BPPV, vestibular neuronitis, labyrinthitis, acoustic neuroma (a type of tumor affecting the nerve to the ear), stroke, and so on among the various possibilities.

Once Meniere's disease is suspected, the doctor will do a test called an audiogram. This is typically done in the ENT clinics. What they are specifically looking for on an audiogram is a pattern of hearing loss called sensorineural hearing loss, meaning a hearing loss that points to malfunction in the neural pathway.

When we listen to sounds, we hear low frequency and high frequency sounds. In many Meniere's disease, you lose the ability to hear the low frequency sounds. On an audiogram, the doctor is going to look for low frequency hearing loss of a sensorineural type. This is what tells them that you may have Meniere's disease.

Can it be treated?

How is Meniere's disease treated? Meniere's disease is typically managed through a combination of lifestyle changes, medications, and sometimes surgical procedures. Reducing salt intake and avoiding caffeine, alcohol, and tobacco can help manage symptoms. Some people find that following a low-salt diet can help reduce the frequency and severity of vertigo attacks. Medications used include betahistidine and diuretics (fluid pills) such as thiazide. For some patients, none of these things work and surgical measures may need to be considered.

Vestibular rehabilitation therapy involves exercises that help improve balance and reduce sensitivity to movement,

which can help with symptoms of vertigo. In some cases, injections of medications such as steroids or gentamicin directly into the inner ear may be recommended to help control vertigo. In severe cases where other treatments have not been effective, surgery may be considered. Options include endolymphatic sac decompression, vestibular nerve section, or labyrinthectomy.

How an audiogram is performed?

An audiogram is a test used to measure a person's hearing ability by assessing their sensitivity to different sounds. Overall, an audiogram is a valuable tool for assessing hearing health and guiding treatment decisions for individuals with hearing concerns.

1. **Preparation:** The individual undergoing the test will be seated in a quiet room or soundproof booth to eliminate background noise interference.
2. **Equipment:** The audiologist conducting the test will use a machine called an audiometer, which generates sounds at varying frequencies and intensities. The audiometer is connected to a pair of headphones worn by the individual.
3. **Test Procedure:**
 - **Pure Tone Audiometry:** This test involves the individual listening to a series of tones played

at different frequencies (pitch) and volumes (loudness) through the headphones. The person will be asked to indicate when they hear each sound by either raising their hand or pressing a button.

- **Speech Audiometry:** In this test, the individual is asked to repeat words or sentences spoken at different volumes to assess their ability to understand speech.
4. **Data Recording:** The audiologist records the individual's responses on a graph called an audiogram. The audiogram plots the hearing thresholds (the softest sounds that can be detected) at different frequencies, typically ranging from low to high pitches.
 5. **Interpretation:** Based on the results of the audiogram, the audiologist can determine the individual's hearing levels, identify any hearing loss, and decide on appropriate treatment options if necessary.
 6. **Discussion and Recommendations:** The audiologist will discuss the test results with the individual, explain the implications of the findings, and recommend any further evaluations or interventions to address any identified hearing issues.

9.

I had a dizzy spell, now it's gone. Should I be worried?

What's happening?

Sometimes you may have a spell of dizziness that is very short-lived. Everything was spinning around for a short period of time, but now it is all gone. It's definitely a relief that the dizziness is gone, but there may be an ominous cause behind it. Do not assume it was simply a moment of dizziness.

What is it?

Like many forms of dizziness, the cause of a dizzy spell could indicate different conditions. Of those listed below, the cause may be related to a recent episode or ongoing condition.

One cause for concern is the manifestation of a mini stroke, or **transient ischemic attack (TIA)**, that is affecting the back of the brain. Why is this significant? A transient ischemic attack implies a danger of a risk of stroke in the near future. If the dizzy spell was accompanied by double vision, mild confusion, some hearing impairment, difficulty with speech, or any combination of these signs, it is more likely to be a mini stroke than something else.

There's also a condition called **vestibular paroxysmia** where a tiny blood vessel compresses or presses on the vestibular nerve creating repeated spells of spinning each time lasting just a few seconds. This can happen several times a day, and can be disabling in nature. It may even stump doctor after doctor, unless they have heard about this condition.

If you recently had any events where you had some trauma to the neck or neck manipulation, such as any kind of sports injuries, ice hockey injuries, traffic accidents, or chiropractic maneuvers of your neck, and soon after that you had a spell of spinning, there is one more possibility to consider. There's a condition called **vertebral artery dissection**, which means a tear in one of the blood vessels that goes to the brain, which can present with the onset of dizziness.

Dissection of a blood vessel in the neck can lead to a stroke, in which case the dizziness would persist, but sometimes it can just cause a transient ischemic attack, where the symptoms resolve by themselves, but the risk of an actual stroke hangs over you.

Transient spells of dizziness can also happen in other conditions such as **rotational vertebral artery syndrome**, where turning your head to the right or to the left temporarily kinks the vertebral artery and causes a spell of dizziness, which goes away.

Spells of dizziness provoked by neck movement also occur in something called **subclavian steal syndrome**, where blood flow that is supposed to go to the brain gets misdirected into the arm instead. This is the result of a partial blockage in the subclavian artery that has the combined function of supplying blood to the brain as well as the arm.

What will my doctor do?

Transient ischemic attack requires a thorough neurological examination to identify specific signs and symptoms associated with posterior circulation deficits. An MRI with diffusion-weighted imaging (DWI) is the preferred method to detect acute ischemic changes. magnetic resonance angiography (MRA) and computed tomography angiography (CTA) can help evaluate the blood vessels in the posterior circulation. Vascular imaging may also be used, as well as a cardiac workup. Early recognition, accurate diagnosis, and prompt management of posterior circulation TIAs are crucial to prevent the occurrence of a major stroke and associated complications. Collaborative care involving neurologists, neuroradiologists, and vascular specialists is

key in ensuring comprehensive evaluation and treatment of patients with posterior circulation ischemic events.

A comprehensive evaluation by a healthcare provider, typically a neurologist or an otolaryngologist, is crucial for an accurate diagnosis. The following procedures and tests may be used to diagnose **vestibular paroxysmia**: detailed medical history, vestibular function tests, MRI imaging, and brainstem auditory evoked response (BAER) testing. The latter test measures electrical activity along the auditory pathways and can help assess the function of the vestibulocochlear nerve.

For **rotational vertebral artery syndrome**, certain factors may increase the risk of developing the condition, such as a history of neck trauma, cervical spine abnormalities, or anatomical variations that affect the position of the vertebral artery. To diagnose this, a thorough medical history and physical examination are essential. Diagnostic tests might include imaging techniques, such as MRA or CTA, or Doppler ultrasound, which can help visualize the vertebral artery to reveal any abnormalities or compression. Dynamic imaging, such as dynamic angiography or digital subtraction angiography, may be performed to evaluate changes in blood flow during neck movements.

Diagnosing **vertebral artery dissection** usually involves a combination of clinical evaluation, imaging studies, and specialized tests. Common diagnostic methods include medical history and physical examination, imaging studies such as MRI, MRA, or CTA, Doppler ultrasound, and

cerebral angiography. Angiography is a procedure in which contrast dye is injected into the blood vessels to visualize abnormalities in the arteries. It is important for individuals with signs or symptoms of vertebral artery dissection to seek prompt medical attention for an accurate diagnosis and appropriate treatment. Early detection and management can help prevent potentially serious complications such as stroke or permanent neurological damage.

When your doctor examines you, if he were to check the blood pressure in both arms, he would notice a difference of 15 millimeters or more of pressure between the right arm and the left arm. This should raise suspicion of **subclavian steal syndrome**. Ultrasound studies can show that there's a blockage in the subclavian artery. The blockage leads to an abnormal flow in which some of the blood supply to the brain is diverted into the arm during specific situations, such as turning your head to that particular side or when you are exercising with that particular arm. This condition is more common on the left side, but it can also happen on the right side.

Can it be treated?

Transient ischemic attack can be treated with antiplatelet therapy (using aspirin), anticoagulation agents such as warfarin, or addressing specific symptoms such as vertigo with medications such as meclizine. Lifestyle modifications, including regular exercise, a balanced diet,

and smoking cessation are also helpful. Speech therapy and swallowing evaluations may be necessary for those symptoms. In some cases, surgical intervention is required, such as carotid endarterectomy or angioplasty with tenting.

Treating **vertebral artery dissection** depends on the severity of the condition and the presence of complications. The goals of treatment are to prevent any further damage to the artery, reduce the risk of stroke, and manage symptoms. Treatment may include anticoagulant therapy (blood thinning medication), antiplatelet therapy (used to inhibit platelet aggregation to reduce clotting), blood pressure control, physical therapy, and surgical intervention.

Rotational vertebral artery syndrome can be treated with strategies that aim to alleviate symptoms, prevent complications, and improve blood flow to the affected artery. Treatment options may include activity modification, physical therapy, medication, or surgical intervention, depending on the severity. A multidisciplinary approach involving neurologists, vascular surgeons, and rehabilitation specialists may be necessary to tailor treatment plans and optimize outcomes for the individual's specific needs.

Vestibular paroxysmia usually responds well to treatment with medications that suppress nerve hyperactivity. Diagnosis of vestibular paroxysmia can be challenging because the symptoms of this condition can mimic other vestibular disorders. Treatment typically involves the use of medication to reduce nerve hyperactivity and control the symptoms.

The most commonly prescribed medications for vestibular paroxysmia include carbamazepine, oxcarbazepine, or lamotrigine. These medications are known as anticonvulsants or anti-epileptic drugs, and they help to stabilize the nerve impulses that trigger vertigo episodes.

Subclavian steal syndrome is treated surgically because the basic issue is a partial blockage of the subclavian artery.

Tell me more about posterior circulation transient ischemic attack.

Posterior circulation transient ischemic attacks (TIAs) occur when there is a temporary disruption of blood supply to the posterior part of the brain, which includes the brainstem, cerebellum, and occipital lobes. Recognizing and promptly diagnosing a posterior circulation TIA is essential as it can present with unique symptoms and have significant clinical implications.

Symptoms include vertigo and dizziness, diplopia (double vision), ataxia (lack of coordination or unsteadiness), nausea and vomiting, loss of vision or visual disturbances, difficulty swallowing, altered level of consciousness, generalized weakness, sensory loss, or speech disturbances. Signs (what the doctor sees) may include involuntary eye movements, Horner syndrome, difficulty swallowing, slurring of speech but grammar is correct, cranial nerve palsies, weakness of one side or quadriparesis, cerebellar dysfunctions, or gait

abnormalities. Horner syndrome includes decreased pupil size, a drooping eyelid, and/or decreased sweating on the affected side of the face.

Tell me more about vestibular paroxysmia.

Vestibular paroxysmia is a neurological disorder characterized by recurrent, sudden, and brief episodes of vertigo. These episodes are usually very intense and can be triggered by various factors such as head movements, certain positions, or even by loud noises. In addition to vertigo, patients may also experience symptoms like dizziness, imbalance, nausea, and sometimes even hearing symptoms like tinnitus or hearing loss.

The episodes of vertigo typically last from a few seconds to several minutes but can vary in duration. Patients may experience episodes multiple times a day or several times a week.

Tell me more about rotational vertebral artery syndrome.

Rotational vertebral artery syndrome, also known as Bow Hunter's syndrome, is a rare but serious condition that occurs when rotation of the neck leads to compression of the vertebral artery. This compression can result in reduced

blood flow to the brain, causing symptoms such as dizziness, vertigo, imbalance, headache, and in extreme cases, stroke. Symptoms of rotational vertebral artery syndrome typically occur when there is a sudden and significant rotation of the neck, such as when looking over one's shoulder, or during a sudden movement.

Symptoms are often intermittent and may improve when the neck returns to a neutral position. In more severe cases, patients may experience neurological symptoms such as weakness, numbness, or tingling in the arms or legs due to compromised blood flow to the brainstem and spinal cord.

Tell me more about vertebral artery dissection.

Vertebral artery dissection is a condition in which a tear occurs in the inner lining of the vertebral artery, a crucial blood vessel that supplies blood to the brain. This tear can lead to the formation of a blood clot, which may obstruct blood flow to the brain and cause symptoms ranging from mild to severe. Vertebral artery dissection can be either spontaneous or due to trauma, such as a whiplash injury or neck manipulation.

Characteristics include neck pain, headache, dizziness or vertigo, blurred or double vision, vision loss, nausea, vomiting, speech or swallowing difficulties, and/or weakness or numbness usually affecting one side of the body, such as the face, arm, or leg.

Tell me more about transient subclavian steal syndrome.

This is a very interesting and very strange condition. The subclavian arteries are the large vessels that supply blood to the arms, one on either side. The vertebral arteries branch off from the subclavian arteries. These extremely important arteries carry blood to the back of the brain, including to the parts of the brain that control vital brain functions such as breathing. Subclavian steal syndrome is more commonly seen on the left side, meaning if someone turns their head to the left side, they become dizzy and lightheaded.

In subclavian steal syndrome, there is partial block in the subclavian artery. The blockage is just before the vertebral artery branches off from the subclavian artery. When the person turns his head to that side, or uses the arm on that side, the blood flow that goes up the vertebral artery drops and the direction of blood flow changes briefly and goes downward instead of up into the brain. The more blood redirected to the arm, the less goes to the brain, resulting in dizziness.

10.

I woke up dizzy, vomiting, and with a headache.

What's happening?

You woke up this morning feeling dizzy, and when you sat up, you felt nauseous with a headache. You may have vomited, experienced double vision, and your headache may have turned into the worst headache of your life. This is a frightening experience, and it should be—it may be a type of stroke, and it requires immediate emergency attention.

What is it?

If you get this combination of severe dizziness, headache, nausea, and vomiting, the first thing to think about is a stroke affecting the back of the brain, also called a **posterior circulation stroke**. In this type of stroke, where the

main symptom is dizziness, headache, nausea, and vomiting, the stroke is generally in the back of the brain.

There are two kinds of stroke. **Stroke** can be what is called ischemic, where a blood vessel is blocked off and a part of the brain is damaged, or it can be a bleeding inside the substance of the brain (called the brain parenchyma). Either of these conditions is dangerous and potentially life threatening.

If you get this combination of severe headache, spinning, nausea, and vomiting, you have to be seen in the emergency room ASAP. If you are going by ambulance, as you should, they will take you straight to the exam room. If you get there by private vehicle, let the front desk know right away that you are having a stroke and that you need immediate attention, so that time is not wasted filling out forms (and enjoying privacy statements and mission statements and other lawyerly masterpieces).

Yet another villain to consider in a scenario of severe headache, nausea, and vomiting is something called **subarachnoid hemorrhage**. This means bleeding on the surface of the brain (not in the substance of the brain) caused by the rupture of an aneurysm, which is a tiny outpouching of a blood vessel. Subarachnoid hemorrhage typically presents with “the worst headache of my life.” This is also a life-threatening condition which should propel you to the emergency room immediately.

Two other conditions with similar presentation are labyrinthitis and basilar migraine.

In **labyrinthitis**, you can get a combination of a spinning sensation, hearing impairment on one side, nausea, and vomiting, with or without ear pain. Ear pain is a more common symptom than headache in labyrinthitis. See the chapter on labyrinthitis (chapter 4) for more information on this condition.

There is a type of migraine called **vertebrobasilar migraine**, which is migraine that affects the back of the brain. In this condition you can get a combination of severe headache, nausea, and vomiting, along with visual symptoms such as blurred vision. Generally, a person with vertebrobasilar migraine will already have an established history of migraines. See the chapter on vertebrobasilar migraines (chapter 6) for more information on this condition.

Tell me more about this type of dizziness.

Posterior circulation stroke refers to a type of stroke that occurs in the back part of the brain, which is supplied by the vertebrobasilar system. This area is responsible for various important functions such as coordination, balance, vision, and sensation. Posterior circulation stroke can present with a wide range of symptoms and can be challenging to diagnose due to the diverse and nonspecific nature of the signs and symptoms.

Characteristics of posterior circulation stroke include:

- Vertigo and dizziness
- Nausea and vomiting
- Impairment of eye movement control, which can result in double vision, blurred vision, or loss of vision in one or both eyes
- Difficulty swallowing
- Ataxia, or impaired coordination and unsteady gait

Subarachnoid hemorrhage (SAH) is a type of stroke that occurs when there is bleeding into the subarachnoid space, which is the area between the brain and the surrounding membranes. This condition is usually caused by the rupture of a weakened blood vessel in the brain, often due to conditions like aneurysms or arteriovenous malformations. SAH is a medical emergency that requires prompt diagnosis and treatment to prevent serious complications.

In the case of subarachnoid hemorrhage, patients may experience:

- Sudden and severe headache (the worst headache of one's life)
- Nausea and vomiting, often with neck stiffness
- Altered mental status, confusion, drowsiness, or loss of consciousness
- Weakness on one side of the body, vision changes, or difficulty speaking
- Seizures

What will my doctor do?

Given this list of possibilities, what does the doctor do next? With the possibility of a stroke, labyrinthitis, migraine, and subarachnoid hemorrhage, the best approach is to assume the worst cases, which are stroke or hemorrhage. Your doctor would need to do a brain scan and look for evidence of a stroke or bleeding. At least in theory, when the doctor examines you and you have this combination of headache, dizziness, nausea, and vomiting, there may be telltale signs of stroke, such as abnormalities in the movements of your eyes or impairment in your coordination or strength, but not always.

In this type of emergency, doctors cannot depend entirely on the other findings of an exam, especially in a busy emergency room where you may or may not be seen by a neurologist. Therefore, to rule out a stroke, which is extremely important given the life-threatening significance of a stroke, a brain scan is necessary. When a stroke is ruled out, then doctors consider other, less dangerous possibilities. What if the doctor cannot tell if it is a stroke or a migraine? Migraines are harmless, whereas strokes are life-threatening. Therefore, your doctor will probably assume the worst of the two and act accordingly.

If you have a combination of headache, dizziness, nausea, and vomiting, and you feel that this particular headache is the worst headache of your life, be sure to tell the doctor just that. “The Worst Headache of One’s Life” is a screaming siren

and flashing red lights kind of event, where every minute counts. Until proven otherwise, your doctor will assume that you have an aneurysmal bleed and that an aneurysm has burst open, pouring blood over the surface of your brain. The doctor in the ER would first do a CT scan of the brain, and if this is not conclusive, he may do a procedure called a lumbar puncture, also known as a spinal tap.

One of the things the doctor will look for when examining you is subtle jerky movements of your eyes. Specifically, he is looking for something called direction-changing nystagmus. What does that mean? Those jerky movements of the eyes tend to be in a specific direction if the problem is in your inner ear. But if the problem is in the brain, depending on where the person is looking, the direction of these jerky movements will change. And needless to say, a problem in your brain is way more serious than a problem in your inner ear.

Another strange little test that the doctor will do on you is called a head impulse test. He will sit facing you, and ask you to focus your eyes on his nose. Then he will hold the sides of your head and move your head from side to side. What is he looking for? If the inner ear is working well, as he moves your head, the eyes will unfailingly remain focused on his nose. But if there is a problem in either of your inner ears, then on that particular side the eyes will have difficulty staying focused, and they may jump around a bit as he moves your head. Strangely enough, if the damage is in your brain instead of in your inner ear, this test may not show any abnormalities at all.

Either way, when in doubt, the best option is to get an emergent brain scan. Generally, MRI scans are not available in most emergency rooms on short notice. CT scans are readily available, and this is what is typically done when you go to the emergency room. Oftentimes, CT scan may not be precise enough to pick up a stroke in the back of the brain. When stroke is a consideration, the ER physician may also get something called a CT angiogram of the head and neck, which allows him to see any large clots, as well as a CT perfusion scan, which provides him with color-coded image of the brain. These tests tell him quickly whether areas of the brain show compromised blood flow.

Can it be treated?

Treatment for posterior circulation stroke is similar to anterior circulation stroke. Treatment may include intravenous thrombolytic therapy (tPA) if the stroke is due to a clot. Endovascular therapy, such as mechanical thrombectomy, is used in selected cases to remove the clot blocking the blood vessel. Your doctor may also prescribe medications to control blood pressure, blood sugar levels, and other complications. Rehabilitation therapies, such as physical, speech, or occupational therapy, will help regain lost function and improve quality of life.

In **subarachnoid hemorrhage**, patients with suspected SAH should be immediately hospitalized in a specialized stroke unit or neurocritical care unit for close monitoring.

If an aneurysm is identified as the cause, it may need to be treated to prevent rebleeding, such as surgical clipping or endovascular coiling. Blood pressure will need to be controlled, and antiseizure medications may be prescribed. Supportive care may include pain management, hydration, and prevention of complications such as deep vein thrombosis.

11.

I've been losing my hearing in my right ear and becoming dizzy.

What's happening?

You're experiencing dizziness and hearing impairment in one ear, and it's been going on for months. In fact, it seems to be getting gradually worse and doesn't go away. You may even have tinnitus, a persistent or recurring ring or tone in your ear. You're pretty sure it has something to do with your ear itself, but you're not sure what it could be.

What is it?

It's possible it could be a **vestibular schwannoma**, which is a tumor that arises in the vestibular nerve itself and leads to

gradual hearing loss on one side with ringing in the ear. With tumors affecting the vestibular nerve, the most prominent symptom is gradually worsening hearing loss, but to some extent this will also cause dizziness.

This is one of those tumors that has been reported to have association with excessive cell phone use, but as you can imagine the connection is a bit controversial. This type of tumor can also occur in an inherited condition called **neurofibromatosis**. So, if you or your family has a history of neurofibromatosis and there is gradual hearing loss in one side, a tumor growing on the vestibular nerve is a possibility to consider.

Tell me more about this type of dizziness.

Tumors affecting the vestibular nerve are typically referred to as vestibular schwannomas, also known as acoustic neuromas. These are benign, slow-growing tumors that develop on the vestibular nerve, which is responsible for transmitting balance signals from the inner ear to the brain.

Vestibular schwannomas can cause a variety of symptoms, including hearing loss, tinnitus (ringing in the ears), vertigo (dizziness or spinning sensation), imbalance, and pressure or fullness in the ear. In some cases, these tumors can grow large enough to compress nearby structures, such as the facial nerve, leading to facial weakness or numbness.

What will my doctor do?

Whenever there is hearing loss and ringing in the ear, the doctor will first look into common things such as ear wax, infection in the ear, and so on. These things can be easily ruled out when he examines you with an otoscope. Another thing he would look for is the pattern of hearing loss. If there is any kind of obstruction in the ear such as wax, or if there is an infection or fluid in the middle ear, the pattern of hearing loss is called conductive hearing loss.

The doctor will do a test using a tuning fork. This test is called the Rinne test. Generally, he would hold it next to your ear and see how long you hear the buzzing sound. Then he would place the tuning fork on the bone behind your ear and ask if you can still hear the sound as it is transmitted through the bone. If the hearing loss is due to something affecting the middle ear (such as fluid or infection) or the external ear (such as wax accumulation), the conduction of sound that you hear through the bone is better than the sound you hear through the air. The same sound that is presented by applying the tuning fork to the bone behind your ear may be heard better than when the tuning fork is next to your ear.

Now, if there's a tumor affecting the nerve that goes to the inner ear, the pattern of hearing loss is different. It's called a sensorineural hearing loss, where the hearing loss is the result of damage to the nerve itself. In this case, when the doctor does the Rinne test, you would hear the tuning fork held in front of your deaf ear better than the tuning fork pressing against the bone behind your deaf ear.

He will also do another quick test called the Weber test. He will press the stem of the vibrating tuning fork on your forehead and pose the following question: in which ear can you hear it better? If you are hearing it better in your normal (non-deaf) ear, it may be an indicator that your hearing loss is because of something affecting the nerve rather than the middle ear or outer ear itself.

An MRI of the brain with contrast enhanced images is a common diagnostic tool. Generally, this will show whether a tumor is present.

Your doctor will probably do an audiogram, which will test to see what kind of hearing loss you have. If it is confirmed that you have a sensorineural type of hearing loss, he will next try to determine if it is affecting high frequency sounds or low frequency sounds. If it is affecting high frequency sounds, this points to a problem in the nerve itself. If it is affecting low frequency sounds, then it's more likely something like Meniere's disease, which is also a condition characterized by fluctuating symptoms of vertigo, hearing loss, and ringing in the ear.

Can it be treated?

Treatment options for vestibular schwannomas depend on various factors, including the size and growth rate of the tumor, the patient's age and health status, and the severity of symptoms. Treatment may include observation with periodic

imaging, radiosurgery, or surgical resection to remove the tumor.

Aside from vestibular schwannoma, there are also other tumors that can affect this particular nerve and present in a similar manner. As you can imagine, the treatment for this condition is primarily surgical. If a tumor affecting the vestibular nerve is found, your doctor will be referring you to a neurosurgeon.

12.

I get dizzy spells where
the world looks, feels,
and smells strange.

What's happening?

You feel dizzy or have a spell of dizziness, but with it comes a feeling that something about your surroundings is unusual or different. The world may seem brighter or duller than you remember it to be. Things might sound different than they should. Or you may feel disoriented or in a dreamlike state. Feeling like your environment seems different than normal is called altered sensorium.

What is it?

Combined, these symptoms raise the question of whether that spell of dizziness is a seizure. There are different types

of seizures that can manifest with strange symptoms and may be perceived as a sense of dizziness (for lack of a better description). It could be a **vestibular seizure** or **subclavian steal syndrome**.

Tell me more about this type of dizziness.

Let us have a quick discussion about seizures. When you hear doctors refer to seizures as *complex* or *simple*, this refers to whether it alters your level of awareness or alertness. Confusion or disorientation indicate complex seizures. Simple seizures show no alteration of awareness of any kind.

You will also hear the terms *partial* and *generalized* when doctors discuss seizures. Partial implies that only a part of the brain is affected. Symptoms are limited to a part of the brain. A generalized seizure means that the electrical seizure activity involves the entire brain, and as a consequence, people have more severe symptoms.

As you can imagine, if seizure activity is only affecting a small part of the brain and not spreading anywhere else, it can cause limited symptoms, which to a non-physician may not even look like a seizure. In fact, there are types of seizures where the person could be just sitting there and talking with you, and you may notice that he or she is a little bit spacey or inattentive, and that could very well be a seizure (as opposed to the other possibility that he or she is simply

bored listening to you). Expanding on the same principle, a small (partial) seizure that arises from the vestibular cortex can simply cause some degree of dizziness without causing any other symptoms.

One of the interesting things about seizures is that, when they arise from the same part of the brain, they can cause the exact same type of symptoms again and again. The seizure is easily reproduced. This is an important distinction between seizures and mini strokes because, in mini strokes (TIAs), the symptoms may be different each time, whereas with seizures, the symptoms tend to be the same every time.

What will my doctor do?

Whenever you are having a spell of dizziness that is very short-lived and disappears just as fast as it came on, there are a few other possibilities to consider. Vestibular seizures, which cause recurrent short spells of dizziness, is one possibility. However, your doctor should consider more common things first. Once he clinically suspects **vestibular seizures**, the next step is to obtain an electroencephalogram (EEG), and, if needed, an ambulatory EEG. The EEG involves placing electrodes on top of the scalp to pick up electrical signals from the brain, amplify them, and send them to a recording device. The ambulatory EEG is an at-home test, where you wear wireless electrodes on your head while a wireless base unit records the brainwave activity. The neurologist later looks at the recording and analyzes it for

epileptic discharges, which typically look like sharp waves among the normal smooth waveforms.

Diagnosing vestibular seizures typically involves a detailed medical history, physical examination, neurological assessment, and specialized tests such as electroencephalography (EEG) to monitor brain activity during a seizure. Treatment usually involves antiseizure medications to help control and prevent seizure episodes.

For **subclavian steal syndrome**, doctors may use imaging tests such as ultrasound, CT angiography, or magnetic resonance angiography (MRA) to diagnose the condition. A physical exam, medical history, and assessment of symptoms are also important for making a diagnosis.

Electro Encephalogram (EEG).

An electroencephalogram (EEG) is a non-invasive test that is commonly used to diagnose seizures by measuring the electrical activity in the brain. Here is how an EEG is used in the diagnosis of seizures:

1. **Preparation:** Electrodes are attached to the scalp. These electrodes are small, metal discs that are covered with a conductive gel to help pick up electrical signals from the brain.
2. **Recording:** While the patient sits or lies down, the electrodes are connected to a machine that amplifies

the electrical signals and displays them as waves on a computer screen.

3. **Baseline recording:** The EEG records the patient's brain activity at rest to establish a baseline pattern, or what normal brain activity looks like, for comparison.
4. **Activation:** Sometimes specific activation procedures are used to trigger abnormal brain activity that may be associated with seizures. This may include deep breathing, flashing lights, or sleep deprivation. These procedures help reveal abnormalities that may not be present during the resting state.
5. **Detection:** EEG patterns are interpreted to look for abnormal activity called epileptiform activity. These wave patterns can indicate the presence of seizures or epileptic activity in the brain. The location, frequency, and duration of these patterns helps determine the type of seizure.
6. **Correlation with symptoms:** The EEG findings are correlated with the patient's symptoms and medical history to confirm a diagnosis of seizures. Some patients may experience seizures during the EEG recording, which can provide valuable information for diagnosis.
7. **Additional testing:** In some cases, additional tests such as video EEG monitoring or ambulatory EEG may be recommended for a more comprehensive

evaluation of seizures. These tests can provide more information about the frequency and type of seizures the patient is experiencing.

Overall, the information gathered from an EEG is crucial in diagnosing seizures and determining the most appropriate treatment plan for patients with seizure disorders. EEGs are safe, painless, and effective tools in the diagnosis and management of epilepsy and other seizure disorders.

Can it be treated?

Living with vestibular seizures can be challenging, as they can significantly impact an individual's quality of life and ability to perform daily activities. It is essential for individuals with these seizures to work closely with healthcare providers to develop a management plan tailored to their specific needs and to ensure their safety and well-being.

It is important for individuals experiencing symptoms of **subclavian steal syndrome** to seek medical attention for proper diagnosis and treatment. Treatment for subclavian steal syndrome depends on the severity of symptoms and the underlying cause. In some cases, lifestyle changes such as quitting smoking, exercising, and managing cholesterol can help improve symptoms. Medications may be prescribed to lower blood pressure or prevent blood clots. In severe cases, surgery or angioplasty with stenting may be necessary to improve blood flow to the arm.

With appropriate treatment, most people with subclavian steal syndrome can experience relief from symptoms and lead a normal life. However, untreated or severe cases may lead to complications such as stroke or heart attack.

Tell me more about vestibular seizures.

Vestibular seizures, also known as epileptic vertigo or seizure-related vertigo, are a type of seizure disorder that affects the vestibular system, which is responsible for maintaining balance and spatial orientation in the body. These seizures typically arise from abnormal electrical activity in the brain involving the areas responsible for processing balance and spatial information.

Symptoms include:

- vertigo, spinning, or dizziness, which may be mild or severe
- nausea and vomiting
- loss of balance
- blurred vision, visual hallucinations, or sensitivity to light
- a change in awareness, confusion, or loss of consciousness
- involuntary, rapid or jerky eye movements
- sensory disturbances such as tingling sensations, numbness, or other abnormal sensations

These symptoms may occur suddenly and without warning, making everyday activities challenging for individuals with vestibular seizures. The duration of these seizures can vary, lasting from a few seconds to a few minutes, or they may persist for longer periods.

Tell me more about subclavian steal syndrome.

Subclavian steal syndrome is a rare condition that occurs when there is a blockage or narrowing in the subclavian artery, which is one of the main arteries that supplies blood to the arms. This causes a reversal of blood flow in the affected subclavian artery, typically occurring when the individual raises their affected arm or during strenuous physical activity. The most common symptom of subclavian steal syndrome is arm pain or weakness, particularly during activities that require the use of the affected arm. Other symptoms may include numbness or tingling in the arm, dizziness, blurred vision, and difficulty concentrating.

Subclavian steal syndrome is usually caused by a blockage or narrowing of the subclavian artery, often due to a buildup of plaque (atherosclerosis). Other causes may include a blood clot or a congenital anomaly in the artery.

13.

I feel dizzy every time I cough or sneeze.

What's happening?

You have a chest infection or are short of breath, and coughing makes you feel dizzy. You may even lose consciousness after coughing, which is related to a sudden increase in blood pressure. When you are short of breath, you are not getting enough oxygen. Impaired lung function by itself is enough to make you feel lightheaded, but because this book is about neurological causes, we may want to look at other concerns.

What is it?

If coughing makes you dizzy, we must consider straightforward, simple dizziness caused by a problem

with lung function. If your oxygen levels are dropping, that means less oxygen is carried to your brain, which therefore makes you dizzy. However, the cause may be more obscure. One possibility is a cardiac issue such as a cardiac rhythm problem provoked by coughing. Or there may be a problem in the back of the brain such as the **Chiari malformation**, which is producing symptoms of dizziness brought on by coughing. It could also be a **perilymph fistula** if you had some kind of trauma to the ear or skull. Lastly, it may be **cough syncope**, in which a coughing episode leads to reduced blood flow to the brain.

Tell me more about this type of dizziness.

While thinking about dizziness provoked by a cough, it's important to understand how coughing affects your body. When you cough, the pressure inside your thorax or chest cavity increases. When the pressure inside the chest wall increases, the rate at which the blood is returning to the heart is slowed down. As a result, when there's less blood going into the heart, the amount of blood pumped out of the heart also drops. There's a momentary drop in the amount of blood that the heart is pumping, and naturally that can lead to dizziness.

In some people, the act of coughing can lead to a temporary drop in blood pressure. Blood pressure is maintained within the required numbers by a combination of actions performed by the heart, which is pumping blood, and

the blood vessels, which convey the blood to different parts of the body including the brain. This is all regulated by a part of the nervous system called the autonomic nervous system. The autonomic nervous system includes the sympathetic and parasympathetic systems, which regulate the functions in your body. In autonomic dysfunction, the blood pressure drops, and this leads to less blood flow to the brain, which results in dizziness.

What will my doctor do?

Diagnosis of Chiari malformation is usually made through a combination of medical history, physical examination, and imaging studies such as MRI scans. It is important for individuals with suspected **Chiari malformation** to seek medical attention from a neurologist or neurosurgeon for proper evaluation and management of their condition.

Perilymph fistulas are often associated with head trauma, changes in middle ear pressure (such as during air travel or scuba diving), or barotrauma. In some cases, the fistula may be present without a clear cause. Diagnosis often involves a combination of symptoms, medical history, and imaging tests such as a CT or MRI scan. Typically, your doctor would do a CT scan and look for air bubbles in the labyrinth or inner ear to make the diagnosis.

Cough syncope is a rare but potentially concerning condition that warrants medical attention to ensure

appropriate management and to prevent any potential complications associated with recurrent episodes of fainting. It is important to note that cough syncope should be evaluated by a healthcare professional to rule out any underlying conditions that may contribute to the severity or frequency of these episodes.

Your doctor may investigate your condition using a tilt table test. This test is usually performed in the cardiology lab. The table is tilted at different angles while attempting to reduce symptoms. During the test, the doctor will observe heart rate, blood pressure, and other things. If the tilt table test is used to test whether coughing causes the dizziness, he may ask you to cough while on the table.

Can it be treated?

Treatment options for **Chiari malformation** may include medication for symptom management, physical therapy, and surgery to relieve pressure on the brainstem and to restore the normal flow of cerebrospinal fluid. Early diagnosis and appropriate treatment can help improve symptoms and prevent complications associated with Chiari malformation.

Treatment for a **perilymph fistula** typically involves conservative measures such as rest, avoiding activities that worsen symptoms, and sometimes the use of a pressure-equalizing tube in the ear. In severe cases or when conservative management fails, surgical repair of

the fistula may be necessary to restore proper inner ear function. It's important to consult with an otolaryngologist or ear specialist for proper diagnosis and management of a perilymph fistula.

After an evaluation by a healthcare professional, **cough syncope** can be treated by managing the underlying cause of the cough, such as treating respiratory infections or optimizing asthma control. Some individuals may also benefit from medications to help suppress cough reflexes.

Tell me more about perilymph fistula.

A perilymph fistula is an abnormal communication between the inner ear's perilymphatic space and the middle ear or surrounding structures. The inner ear is filled with two fluid-filled compartments: the scala vestibuli and the scala tympani, both of which contain perilymph. This fluid helps transmit sound signals to the brain.

When a perilymph fistula occurs, a small tear or opening in the membrane separating the inner ear from the middle ear allows perilymph to leak out. This can lead to a variety of symptoms, including hearing loss, dizziness, vertigo, imbalance, and sensitivity to sound or pressure changes. These symptoms may worsen with certain activities that change pressure within the ear, such as straining, sneezing, lifting heavy objects, or flying in an airplane.

Tell me more about cough syncope.

Cough syncope, also known as cough-induced syncope, is a condition characterized by the sudden loss of consciousness or fainting after a person experiences a bout of intense coughing. This phenomenon is uncommon but can be alarming for those who experience it. Cough syncope is a rare but potentially concerning condition that warrants medical attention to ensure appropriate management and to prevent any potential complications associated with recurrent episodes of fainting.

The sequence of events leading to cough syncope typically includes:

1. A sudden, forceful, and persistent cough triggers increased intrathoracic pressure.
2. This causes a temporary rise in blood pressure, which results in decreased blood flow.
3. Less blood to the brain means less oxygen to the brain.
4. Insufficient oxygen to the brain can cause a temporary loss of consciousness.

After the individual faints or loses consciousness for a brief period, typically lasting from a few seconds to a minute, and the coughing episode subsides, blood flow returns to normal, and the person usually regains consciousness.

Tell me more about the Chiari malformation.

Chiari malformation is a rare condition where the cerebellum, which is the lower part of the brain, extends down into the spinal canal through an opening at the base of the skull known as the foramen magnum. This displacement puts pressure on the brainstem and can block the flow of cerebrospinal fluid, which is the clear liquid that surrounds and cushions the brain and spinal cord.

There are several types of Chiari malformation, with Type I being the most common. In Type I Chiari malformation, the cerebellar tonsils, which are the lowest part of the cerebellum, extend down into the foramen magnum. Type II, also known as Arnold-Chiari malformation, is typically associated with myelomeningocele, a form of spina bifida, and involves more extensive displacement of the brain tissue into the spinal canal.

Symptoms of Chiari malformation can vary depending on the severity of the condition and may include headaches, neck pain, dizziness, problems with balance and coordination, difficulty swallowing, muscle weakness, and even breathing difficulties. These symptoms can worsen over time if left untreated.

14.

I feel dizzy when I walk, and my vision is all jumpy.

What's happening?

There is a type of dizziness that is most evident when you're walking, and if you stand still, it gets better. If you are walking on uneven ground, it gets worse. If it's dark, it gets worse. And what is even more interesting about this type of dizziness is that head movements make your vision blurry. For example, if you're trying to watch TV or read something and you're moving your head around, it becomes very hard to read or see, and objects will look blurry when your head is moving. This phenomenon where movement leads to blurred vision is called oscillopsia.

What is it?

A condition with these symptoms is called **bilateral vestibulopathy**, in which the vestibular apparatus is damaged

in both of your inner ears. The vestibular apparatus is the scientific term used to describe the part of the inner ear that balances your body. A person with bilateral vestibulopathy, while standing with his eyes closed and his feet together, will sway all over the place as he tries to keep his balance, but he will not necessarily fall.

Tell me more about this type of dizziness.

There are a lot of conditions and causes that give rise to **bilateral vestibulopathy**. There is a category of antibiotics called aminoglycosides, including gentamycin. Excess amounts of this antibiotic can damage the inner ear. Fortunately it is not prescribed as often anymore.

Chemotherapy, excessive use of aspirin, excessive use of diuretics such as furosemide, immunotherapy, excessive use of NSAIDs, and so on, can also damage the vestibular apparatus on both sides. Infections such as meningitis, Lyme's disease, herpes simplex (the virus that causes cold sores) can also damage the vestibular apparatus on both sides. Trauma and a number of autoimmune conditions can damage it, too. These include conditions such as sarcoidosis, antiphospholipid syndrome, and many more.

Other conditions that can cause dizziness, such as Guillain-Barre syndrome, Meniere's disease, and labyrinthitis, have the potential to damage both vestibular apparatus. Vitamin

B₁, B₁₂, or B₉ (folate) deficiency, low thyroid hormone levels, and other biochemical deficiencies can cause this condition. Many people who develop peripheral neuropathy, often as a result of diabetes mellitus, also acquire bilateral vestibulopathy.

What will my doctor do?

When your doctor examines you, he'll perform something called a head impulse test (HIT). To do the head impulse test, the doctor will face you, hold your head in his hands, and then ask you to look at his nose while he moves your head sideways.

And generally, if your eyes are fixated on his nose no matter which way your head is moving, your eyes will remain steady. If there is damage to the vestibular apparatus in one side, then when the head is moved towards that side, the eyes will jerk. Instead of staying focused on the nose, patient's eyes may drift off and then try to self-correct.

If only one vestibular apparatus is damaged, the HIT test will be abnormal on one side, but in bilateral vestibulopathy, the HIT test will be abnormal on both sides. There's also a more sophisticated version of the head impulse test—a video head impulse test, which is done in a specialized lab. In a test called caloric testing, warm water is syringed into the ears to test vestibular function. The rotational chair test is a highly scientific way to test for bilateral vestibulopathy and is available in specialized Ear Nose Throat (ENT) clinics.

Can it be treated?

Once the vestibular apparatus is damaged on both sides, the condition is difficult to treat. Treatment primarily consists of vestibular rehabilitation, which involves adapting to the deficits and maintaining balance to minimize the risk of a fall. If a specific cause can be identified, the doctor will attempt to treat the underlying condition.

The treatment plan typically includes a combination of exercises and techniques tailored to the individual's specific symptoms and needs. These exercises may involve head movements, eye exercises, balance training, gait training, habituation exercises (repeated exposure to specific movements that provoke symptoms), and coordination exercises. The therapist may also incorporate manual techniques, education on strategies to manage symptoms, and lifestyle modifications.

Vestibular rehabilitation is a gradual process that requires consistency and commitment from the individual. Over time, as the brain learns to adapt to the vestibular dysfunction, symptoms such as vertigo and dizziness can be reduced or even eliminated. Patients may also experience improvements in balance, coordination, and overall sense of well-being.

Ear Caloric Test.

The ear caloric test is a diagnostic tool used to assess the function of the vestibular system within the inner ear. This test

involves stimulating the inner ear with warm and cold water or air to induce nystagmus, which is an involuntary side-to-side eye movement. The caloric test is typically performed in a medical setting by an audiologist or otolaryngologist.

1. **Preparation:** The patient is seated or lying down. Eye movement recording devices may be used to monitor involuntary, rapid, rhythmic eye movements during the test.
2. **Warm and Cold Stimulation:** The examiner introduces warm (around 44°C or 111°F) and cold (around 30°C or 86°F) water or air into the ear canal separately on each side. This is done using small tubes that are placed within the ear canal.
3. **Observation:** As the warm or cold stimulation affects the inner ear, it disrupts the balance of fluid in the semicircular canals. This disruption causes a temperature-dependent movement of the fluid, which in turn results in nystagmus. The examiner observes and records any nystagmus that occurs, noting the direction, intensity, and duration of the eye movements.
4. **Repeat:** The warm and cold stimulations are carried out on both ears separately, allowing the examiner to assess the response of each inner ear independently.

5. **Analysis:** The recorded eye movements are analyzed to determine the strength and symmetry of the responses from both ears. This analysis helps in assessing the function of the vestibular system and identifying any abnormalities that may be present.
6. **Interpretation:** Based on the findings of the caloric test, the examiner can make a diagnosis and recommend appropriate treatment or additional diagnostic tests if necessary. Abnormalities in nystagmus responses may indicate conditions such as vestibular neuritis, Meniere's disease, or a vestibular schwannoma.
7. **Post-Test Care:** After the caloric test is completed, the patient may experience some temporary dizziness or vertigo. It is important to allow the patient to rest and recover before leaving the medical facility.

Overall, the ear caloric test is a valuable tool in evaluating the function of the vestibular system and can help healthcare providers diagnose and manage various inner ear disorders that affect balance and spatial orientation.

The Rotary Chair Test.

A rotatory chair test is a diagnostic test used to evaluate the function of the vestibular system, which is responsible for maintaining balance and spatial orientation. In cases of bilateral vestibulopathy, where there is dysfunction or

damage to both inner ear vestibular systems, the rotatory chair test can help assess the severity of the impairment. During the test, the patient sits in a specialized rotating chair that can move in various directions at controlled speeds. The patient's eye movements are tracked using video goggles. The patient is rotated in both horizontal and vertical planes. Key aspects of the rotatory chair test in diagnosing bilateral vestibulopathy include:

- **Gain of eye movement:** The test measures the accuracy of the patient's eye movements in response to the chair rotation. In bilateral vestibulopathy, patients may exhibit reduced or absent eye movements that are normally triggered by vestibular signals.
- **Phase of eye movement:** The phase relationship between the chair movement and the corresponding eye movement is analyzed. Abnormal phase relationships may indicate dysfunction in the vestibular system.
- **Visual fixation suppression:** The test evaluates the ability of the vestibular system to suppress involuntary eye movements called nystagmus during head movements. In bilateral vestibulopathy, patients may have difficulty suppressing nystagmus, leading to visual blurring or dizziness.

Overall, the results of the rotatory chair test provide valuable information about the functioning of the vestibular system and help clinicians diagnose and assess the severity of bilateral vestibulopathy. It can also be used to monitor

changes in vestibular function over time and evaluate the effectiveness of treatment interventions.

15.

I am not lightheaded, but
I am unsteady and keep
falling to one side.

What's happening?

If you are unsteady and falling to one side, it can be due to several different conditions, and this requires a very careful evaluation. When you are standing up, balance depends on several of the body's balancing mechanisms, and if any of these mechanisms are defective, you can fall to one side.

What is it?

The answer is fairly simple: it is **an imbalance in the structure of the body**. What is less simple is how this imbalance can occur. From muscle or joint imbalances to weakness on

one side from a stroke, any number of conditions could cause you to feel unsteady.

Tell me more about this type of dizziness.

Let us think of all the factors that enable you to stand straight instead of toppling to one side. First, you need intact and equal strength on both sides of the body. If one side is weaker, this can lead to loss of balance on one side. And what can cause weakness on one side? The obvious answer is, of course, a stroke.

There are several things that can cause weakness on one side of the body that are strong enough to make you fall to one side. These might include:

- damage to one or more nerves on that side of the body
- damage to the muscles on that side
- spinal cord disease on the same side
- some type of brain disease or damage on the opposite side

The problem is that each one of these locations could be damaged by so many different things: stroke, inflammatory conditions such as multiple sclerosis, vasculitis, sarcoidosis, lupus, bacterial infections, viruses, fungi or other pathogens, metabolic conditions such as vitamin deficiencies, tumors, toxin-related injury, and so on.

Aside from intact strength, what else is needed to maintain balance? You need intact sensory input from that side of the body, meaning your brain has to get sufficient information from your legs to know where you are in relation to your surroundings. Loss of sensation can be due to damage to the spinal cord on that side of the body or to the nerves that carry information to the spinal cord (although this is less likely because most conditions affecting the nerves cause damage to the nerves on both sides).

If you have intact strength and sensation on the affected side of the body, can you still fall over? Yes, because balance needs much more than intact strength and sensation. You also need intact coordination. Coordination is a function of the part of the brain called the cerebellum. Sometimes in the clinic we see individuals who have completely intact strength and sensation, but coordination is impaired on one side as a result of some form of damage to the cerebellum, and as a result, they fall over easily. The cerebellum has a left half and a right half called cerebellar hemispheres, and each one controls coordination on the same side of the body. That is, the left side of the cerebellum coordinates the left side of the body (unlike the cerebrum or the main part of the brain which controls the opposite side of the body).

What else is needed to maintain balance? Intact vestibular function is needed as well. Vestibular neuropathy is one of the conditions that can damage the vestibular system and lead to a spinning feeling with a tendency to fall to that side.

What will my doctor do?

When a doctor evaluates your nervous system, he follows a two-step reasoning process. The first step is to localize, which means he tries to logically determine the site of the damage. Is it in the spine, the brain, the muscle, or somewhere in between? Once he narrows down the location, the second step is differential diagnosis, where he goes through a list of possible conditions that could potentially damage the nervous system at that location. Then, through a logical process of analyzing your symptoms, his findings on examining you, and the results of the tests he runs, he determines your final diagnosis. Only after this point can he determine treatment options.

The doctor will check sensation in your legs, especially joint position. He will ask you to close your eyes and move your toes in random directions while you indicate to him your perception of the movement of your toes. He will also check your ability to sense vibration in your legs using a tuning fork. If the sensation is impaired, he will attempt to find out how extensive this loss of feeling is. Is it limited to the leg, or is it also affecting your abdomen or chest? What he is looking for is whether you have any damage to the spinal cord, and if so, which part of the spinal cord is damaged. Then he knows where to focus the MRI scans.

Doctors will evaluate your vestibular function using a test called the HIT or head impulse test. The doctor faces you, and while he holds your head, he will ask you to keep your

eyes fixed on his nose. Then he will move your head sideways, towards your right and towards your left, while you try to remain focused on his nose. If there is a vestibular disease of some kind, the eyes will fail to stay fixed on that side and will instead drift from the target.

Doctors also use a simple test called the Romberg test to find out if there is a defect of sensory input or inner ear (vestibular) function. The doctor will ask you to stand with your eyes together. If you are already falling over, even with your eyes open, you may have a problem in your cerebellum. If you are stable with your eyes open, but you topple over as soon as you close your eyes, this is called a positive Romberg. It tells the doctor that you have one of two problems: either a problem in your inner ear (vestibulopathy), or a problem with sensory signals reaching your brain (some type of damage to the spinal cord).

Postural stability is another aspect of overall balance, which is a very complex aspect of human balance that is hard to explain and understand. But if you watch how a doctor evaluates for postural instability, it is easier to understand. The doctor would ask you to stand with your feet together. Then he warns you ahead of time that he is going to give you a gentle shove to see if you topple over (he will not let you fall). Then he asks you to close your eyes. At this point he may shove you forward or pull you backward or push you sideways. If postural stability is intact, you may sway a bit but will never fall over. Parkinsons disease is a condition that affects postural stability.

Can it be treated?

Treatment depends entirely on the condition identified from the tests and investigations.

Romberg Test explained.

Romberg sign is a physical exam test used to assess a patient's balance and proprioception (sense of body position). It is named after the German neurologist Moritz Heinrich Romberg who first described it in the 19th century. The Romberg sign is especially helpful in evaluating patients with conditions affecting the neurological system, such as peripheral neuropathy, multiple sclerosis, or spinal cord injuries.

Here's how the Romberg sign test is performed and interpreted:

1. The patient stands upright with their feet together and eyes open to assess their baseline balance.
2. Next, the patient is asked to close their eyes while maintaining the same standing position.
3. The examiner observes the patient for any swaying, loss of balance, or unsteadiness while their eyes are closed. If the patient remains stable with eyes closed, it suggests intact proprioception and balance control. This is considered a negative Romberg sign.
4. If the patient starts swaying, stumbling, or losing balance when their eyes are closed, it indicates a

positive Romberg sign. A positive Romberg sign is often indicative of sensory ataxia, a condition where there is an impaired ability to sense the position and movement of one's body parts.

5. The Romberg test can also be modified by asking the patient to stand on a firm surface (floor) or a foam pad to further challenge their balance and proprioception.

In summary, the Romberg sign is a simple yet informative clinical test that helps healthcare providers evaluate a patient's balance and proprioception. It can provide valuable insights into the function of the neurological system and guide further diagnostic evaluation and treatment planning.

Tell me more about postural instability.

Postural instability is a common symptom of Parkinson's disease, a progressive neurological disorder that affects movement. When postural instability occurs in Parkinson's disease, it is often referred to as postural instability of parkinsonism.

Postural instability in parkinsonism refers to difficulty maintaining balance and stability while standing or walking. People affected by this symptom may experience a tendency to lean or fall backward, stand or walk in a stooped posture, or have difficulty making coordinated movements to prevent a fall.

The underlying cause of postural instability in parkinsonism is related to the degeneration of dopamine-producing cells in the brain. Dopamine is a neurotransmitter that plays a key role in controlling movement and balance. As dopamine levels decrease in the brain, it can lead to impaired communication between different parts of the brain responsible for coordinating movement and balance. In addition to dopamine deficiency, other factors can contribute to postural instability in parkinsonism, including muscle stiffness, rigidity, and impaired reflexes. These factors can affect the ability to make quick adjustments in posture and balance, increasing the risk of falls and injury.

Managing postural instability in parkinsonism usually involves a combination of medications, physical therapy, and lifestyle modifications. Medications that increase dopamine levels in the brain can help improve symptoms of postural instability. Physical therapy can focus on improving strength, flexibility, and coordination to enhance balance and reduce the risk of falls. Additionally, modifying the home environment, using assistive devices like walking aids, and practicing strategies to prevent falls can also be helpful in managing postural instability.

It is important for individuals with parkinsonism and postural instability to work closely with healthcare providers, including neurologists, physical therapists, and occupational therapists, to develop a personalized treatment plan that addresses their specific needs and challenges. Regular monitoring and adjustments to the treatment plan may be necessary as symptoms progress.

Tell me more about sensory ataxia.

Sensory ataxia is a neurological condition that affects a person's ability to coordinate movements and maintain balance due to a loss of proprioception, which is the ability to sense the position and movement of parts of the body. Proprioception is typically provided by sensory feedback from the muscles and joints to the brain.

When someone experiences sensory ataxia, their proprioceptive feedback is impaired, leading to inaccurate perception of body position and movement. This results in difficulties with coordination, balance, and gait.

Causes of sensory ataxia can include peripheral neuropathy, which damages the nerves responsible for transmitting sensory information from the limbs to the brain. Other potential causes include disorders affecting the posterior columns of the spinal cord, which can be caused by vitamin B12 deficiency, multiple sclerosis, or sensory nerve damage.

Symptoms of sensory ataxia can vary but often include:

1. Unsteadiness and difficulty walking in a straight line.
2. Stumbling or swaying while walking.
3. Difficulty with fine motor tasks, such as buttoning clothes or writing.
4. Sensation of numbness, tingling, or lack of feeling in the limbs.

5. “Stomping” gait, where the person lifts their legs higher than necessary.
6. Uncoordinated movements, especially when eyes are closed (Romberg’s sign).

Diagnosis of sensory ataxia typically involves a thorough medical history, physical examination, neurological testing, and possibly imaging studies such as MRI to identify the underlying cause. Treatment focuses on addressing the underlying condition when possible, managing symptoms, and improving balance and coordination through physical therapy and other interventions.

Living with sensory ataxia can present challenges in performing daily activities and maintaining independence. Assistive devices such as canes or walkers may be helpful in providing stability and preventing falls. It is essential for individuals with sensory ataxia to work closely with healthcare providers to develop a comprehensive treatment plan tailored to their specific needs and goals.

Conclusion

There you have it—an analysis of dizziness, what could be causing dizziness, and what can be done about it.

Everything in medicine hinges on being able to see the big picture and the context, and understanding the various causes underlying the symptoms. Some causes may be benign, and some may be dangerous and emergent. The basic principle is to consider all possibilities, and to make sure that the most dangerous possibilities are covered or excluded. Each unique individual's case and clinical circumstances should be considered. It is not enough to rely on artificial algorithms and statistics-based criteria that change every year. These criteria often fail to deliver the best possible results to the individual.

The author hopes that the information in this book gives you some insight into dizziness and how to be your own advocate, so that you can ask the right questions, provide the right information to your doctor, and understand what's involved in diagnosing and treating your condition.

Conditions B - M

CONDITION	Circumstances	Provoked by	Relieved by	Spinning	Lightheadedness	Unsteady	Numbness in extremities	Hearing impairment	Loss of consciousness	Headache	Weakness on one side	Vision impairment	Speech impairment	Nausea / Vomiting	Slow walking
Benign paroxysmal positional vertigo		Turning on one side in bed	Lying still	☒		☒						☒		☒	
Bilateral vestibulopathy		Walking	Standing still	☒		☒						☒		☒	
Chiari malformation		Coughing or sneezing		☒	?	☒	?			☒					
Cough syncope		Coughing			☒				☒						
Guillain Barre syndrome	May follow any infection or vaccination. Weakness of all limbs present usually				☒	☒	☒								
Labyrinthitis	May be during an upper respiratory infection			☒		☒		☒		?				☒	
Mal de Débarquement	May follow a long voyage			?		☒									
Meniere's disease	Intermittent combo of spinning, ringing in an ear and stuffed feeling in same ear			☒		☒		☒							

Conditions N - S

CONDITION	Circumstances	Provoked by	Relieved by	Spinning	Lightheadedness	Unsteady	Numbness in extremities	Hearing impairment	Loss of consciousness	Headache	Weakness on one side	Vision impairment	Speech impairment	Nausea / Vomiting	Slow walking
Neurocardiogenic syncope	Sudden fainting				☒	☒			☒						
Neuropathy	May have a predisposing condition such as diabetes				?	☒	☒								
Orthostatic hypotension		Standing up	Laying down	☒	☒							?			☒
Parkinsonism					?	☒			?						☒
Perilymph fistula		Coughing		☒ when coughing						?					
Posterior circulation stroke				☒		☒	☒	?		Usually not always	☒	?	?	?	
POTS		Standing	Laying down		☒				☒						
Rotational vertebral artery syndrome		Turning the head to one side	Keeping head in neutral position	☒			?		Usual y no		?				
Subarachnoid hemorrhage	Worst headache of one's life			☒	☒	☒	☒		?	Worst headache ever	?	?	?	☒	

Conditions S - V

CONDITION	Circumstances	Provoked by	Relieved by	Spinning	lightheadedness	Unsteady	Numbness in extremities	Hearing impairment	Loss of consciousness	Headache	Weakness on one side	Vision impairment	Speech impairment	Nausea / Vomiting	Slow walking
Subclavian steal syndrome		Exercising the arm	Resting the arm	☒	☒				?						
Transient ischemic attack	A spell of dizziness that lasts less than 24 hours			☒	?	?	?				?	?	?		
Vertebrobasilar migraine	Has history of migraine			☒	☒	☒	?			Yes but not always		?		☒	
Vestibular neuritis	Abrupt onset of spinning without any hearing problems			☒	☒	☒				?				☒	
Vestibular paroxysmia	Several spells of vertigo a day each lasting seconds	Head movements in a specific direction		☒	☒										
Vestibular schwannoma	Slow worsening of hearing			☒			?	☒							
Vestibular seizure	Confusion or disorientation			☒	☒					?				?	

Glossary

acoustic neuroma – see vestibular schwannoma

acute unilateral peripheral vestibulopathy – see vestibular neuritis

aneurysm – a bulge or abnormal swelling in the wall of a blood vessel, like an artery

antiphospholipid syndrome – an autoimmune disease that causes abnormal blood clotting

arteriovenous malformation – an abnormal connection between arteries and veins that bypasses the capillary system

ataxia – a neurological sign that indicates a lack of muscle coordination, which can affect the body's balance, speech, and vision

atherosclerosis – the buildup of fats, cholesterol and other substances in and on the artery walls

audiogram – a graph that shows the results of a hearing test and how well a person can hear sounds in terms of frequency and intensity

autoimmune disorder – when the body's immune system attacks healthy cells, tissues, or organs, sometimes as if they were foreign organisms

basilar migraine – see vertebrobasilar migraine

benign paroxysmal positional vertigo (BPPV) – a disorder that causes brief, repeated periods of vertigo when moving, such as when turning in bed or changing position

bilateral – two-sided or affecting both sides of something

bilateral vestibulopathy (BVP) – a chronic vestibular syndrome that causes unsteadiness when standing or walking

brainstem – a structure that connects the brain to the spinal cord and cerebellum

brainstem auditory evoked response (BAER) test – measures how the brain responds to sounds by detecting electrical activity in the cochlea and auditory pathways

cardiac rhythm – the pattern of electrical impulses that cause the heart to beat

cerebellum – a part of the brain that controls balance and other complex motor functions

Chiari malformation – a structural defect in the brain that occurs when the cerebellum bulges into the spinal canal through the foramen magnum, the opening at the base of the skull

computed tomography (CT) scan – a medical imaging technique that uses X-rays to create detailed images of the inside of the body

computed tomography angiography (CTA) – a non-invasive imaging technique that combines a CT scan with an injection of contrast dye to create pictures of blood vessels and tissues in the body

cough syncope – a rare condition that causes a loss of consciousness after coughing

digital subtraction angiography – a diagnostic imaging technique that uses computer technology to visualize blood vessels in dense soft tissue or bone

Dix-Hallpike maneuver – a test that healthcare providers use to diagnose benign paroxysmal positional vertigo (BPPV)

dynamic angiography – a procedure that uses multiple CT acquisitions at the same section position to evaluate blood vessel flow

ear caloric test – a bedside test that uses temperature differences to diagnose damage to the acoustic nerve and brain stem

electroencephalogram (EEG) – a painless medical procedure that measures the electrical activity of the brain

electromyography (EMG) – a diagnostic procedure that assesses the electrical activity and health of muscles and the nerve cells that control them, called motor neurons

endolymphatic sac decompression – an ear, nose, and throat (ENT) procedure that treats fluid buildup in the inner ear, also known as Meniere's disease

foramen magnum – the hole in the base of the skull through which the spinal cord passes

Guillain-Barre syndrome (GBS) – a rare neurological disorder that occurs when the body's immune system attacks the peripheral nervous system

head impulse test – a bedside examination that assesses the vestibulo-ocular reflex (VOR) during rapid head rotation

Horner syndrome – a rare condition that affects the nerves in the face and eye on one side of the face

inflammatory – relating to inflammation, which is characterized by redness, swelling, pain, and heat to protect tissues damaged by disease or injury

labyrinthine stroke – a small stroke that damages the inner ear by blocking or narrowing the labyrinthine artery, which supplies blood to the inner ear

labyrinthitis – an inflammation of the inner ear's labyrinth, a maze of fluid-filled channels that control balance and hearing

magnetic resonance angiography (MRA) – a non-invasive imaging technique that uses magnetic resonance imaging (MRI) to create images of blood vessels

magnetic resonance imaging (MRI) – a non-invasive medical imaging technique that uses radio waves and strong magnetic fields to produce detailed images of the body's interior

Mal de Débarquement – a rare neurological disorder that causes a persistent feeling of rocking, bobbing, or swaying

Meniere's disease – a chronic inner ear disorder that causes severe vertigo, tinnitus, hearing loss, and a feeling of fullness in the ear

meningitis – an inflammation of the membranes that cover the brain and spinal cord, called the meninges

multiple system atrophy (MSA) – a rare condition that affects the brain and nervous system, causing gradual damage to nerve cells

myelomeningocele – a type of spina bifida that occurs when a sac of fluid containing part of the spinal cord, nerves, and meninges pushes through an open in the baby's spine and skin, resulting in a sac protruding from the back

nerve conduction study (NCS) – a medical diagnostic test that measures how quickly electrical impulses travel through a nerve

neurocardiogenic syncope – a fainting spell that occurs when the body overreacts to certain triggers, like intense emotion, the sight of blood, extreme heat, dehydration, a long period of standing or intense pain

neurofibromatosis – a genetic disorder that causes tumors to grow throughout the body, including in the nervous system, skin, and surrounding bones

neuropathy – nerve damage or disease that can cause pain, numbness, tingling, swelling, or muscle weakness in different parts of the body

orthostatic hypotension – a medical condition that causes a sudden drop in blood pressure when standing up from a seated or lying position

parkinsonism – a clinical syndrome that includes a variety of symptoms, such as tremor, bradykinesia, and unstable posture

perilymph fistula – a tear or defect in the membranes that separate the middle ear from the inner ear, allowing fluid to leak from the inner ear into the middle ear

peripheral neuropathy – a condition that occurs when the nerves outside of the brain and spinal cord are damaged

posterior circulation stroke – a neurological deficit that occurs when the brainstem, cerebellum, thalamus, or occipitoparietal lobe are impaired

postural orthostatic tachycardia syndrome (POTS) – a chronic condition that causes an abnormally large increase in heart rate when standing up or sitting up

postural stability – the ability to maintain the body's center of mass within certain boundaries, also known as stability limits

progressive supranuclear palsy (PSP) – a rare neurological disorder that affects the brain's nerve cells that control movement

proprioception – the internal sense of body position, movement, and force

quadriparesis – a condition that causes weakness in all four limbs, including both arms and both legs

Ramsay Hunt syndrome – also known as herpes zoster oticus, is a rare condition that occurs when the varicella-zoster virus (VZV) reactivates and affects the facial nerve

Romberg test – a physical exam that assesses balance and neurological function

rotational vertebral artery syndrome – a rare condition that occurs when the vertebral artery is compressed during head rotation

sarcoidosis – a rare inflammatory disease that occurs when the immune system overreacts, causing abnormal collections of inflammatory cells to form lumps called granulomas in the body's organs

sea sickness – also known as motion sickness, is caused by a conflict in the inner ear's balance mechanism due to a vessel's erratic motion on water

sensorineural hearing loss (SNHL) – the most common type of hearing loss and occurs when the inner ear, sensory organ, or vestibulocochlear nerve is damaged

stroke – a medical emergency that occurs when blood flow to the brain is blocked or a blood vessel in the brain bursts

subarachnoid hemorrhage – bleeding in the subarachnoid space, which is the area between the brain and the thin tissues that cover it

subclavian steal syndrome – a vascular disorder that occurs when blood flow to the arm is diverted away from its normal target

thrombectomy – a medical procedure that removes a blood clot, also known as a thrombus, from a blood vessel

tilt table test – a noninvasive procedure that evaluates the cause of fainting spells and lightheadedness

transient ischemic attack – also known as a “mini-stroke”, is a medical emergency that occurs when blood flow to the brain is temporarily interrupted

vertebral artery dissection – a rare condition that occurs when the inner lining of the vertebral artery in the neck tears, allowing blood to enter the artery wall and form a clot

vertebrobasilar migraine – also known as basilar migraine, is a rare type of migraine that affects the brainstem

vertebrobasilar stroke – a disruption of blood flow to the posterior circulation system, which supplies blood to the brain stem, thalamus, cerebellum, occipital lobe, and temporal lobes

vestibular – relating to a vestibule, particularly that of the inner ear, or more generally to the sense of balance

vestibular nerve – a nerve connecting the inner ear to the brain

vestibular neuritis – a peripheral vestibular syndrome that causes a sudden, severe, and long-lasting vertigo. It's characterized by a loss of peripheral vestibular function on one side, without any signs of central neurological or audiological issues

vestibular paroxysmia – a rare condition that causes brief episodes of vertigo, either spontaneously or from position

vestibular rehabilitation therapy – a type of physical therapy that uses exercises to improve balance, gait, and other vestibular disorders or symptoms

vestibular schwannoma – a non-cancerous tumor that grows on the vestibular nerve

vestibular seizure – a seizure that can cause vertigo, which is a feeling of rotation or movement

vestibulo-ocular reflex (VOR) – a reflex that acts to stabilize gaze during head movement

vestibulocochlear nerve – each of the eighth pair of cranial nerves, conveying sensory impulses from the organs of hearing and balance in the inner ear to the brain

About the Author

Dr. Kumar is a Board-Certified Neurologist with 24 years of experience as a clinical neurologist. He received his neurology training at the University of Kentucky. He has provided neurological services in the states of Washington, Iowa, Wisconsin, New Mexico, and Nebraska and currently practices in Wisconsin.

The content provided in this book is based on his clinical experience, having provided services to thousands of patients over the years and following an overall philosophy of individualized patient-based medicine instead of statistics-based medicine.

Dr. Kumar was the scientific advisor for the educational app ‘Stroke Simulator’ available on the Apple store. Dr. Kumar is also the author of the “How to Read a Normal Scan” series of neuroradiology educational titles primarily meant for neurology residents and students.

