

Searching for answers
about a diagnosis?

Get the Facts on Primary Periodic Paralysis (PPP)

This rare and potentially
progressive condition
is treatable.



An Introduction to Primary Periodic Paralysis

Have You Ever Had a Primary Periodic Paralysis (PPP) Episode?

Sudden unexplained weakness leaves you unable to move. You may wake up feeling that way the morning after having pasta for dinner. Cold weather can make your muscles ache and lock up. **If any of this sounds familiar, you may suffer from PPP.***

These unexplained symptoms may be caused by a rare genetic disorder called Primary Periodic Paralysis or PPP.¹ The stress individuals face when trying to receive a diagnosis and treatment for PPP may make these symptoms even more difficult to cope with.² It's not unusual to see several doctors and receive many incorrect diagnoses before arriving at the right one.²

One survey reported patients saw an average of 4 doctors—and some as many as 10—before they were finally diagnosed.^{2†}

In some cases, patients experienced symptoms for more than 20 years before receiving a diagnosis of PPP.³

Start Finding Answers About PPP Today

No matter what stage of the journey you are at, there are many questions regarding PPP and how it will impact everyday life and the future. This brochure was developed to answer a broad range of questions that patients with PPP, their families, and their caregivers often have.

*Examples of real stories reported by diagnosed PPP patients.

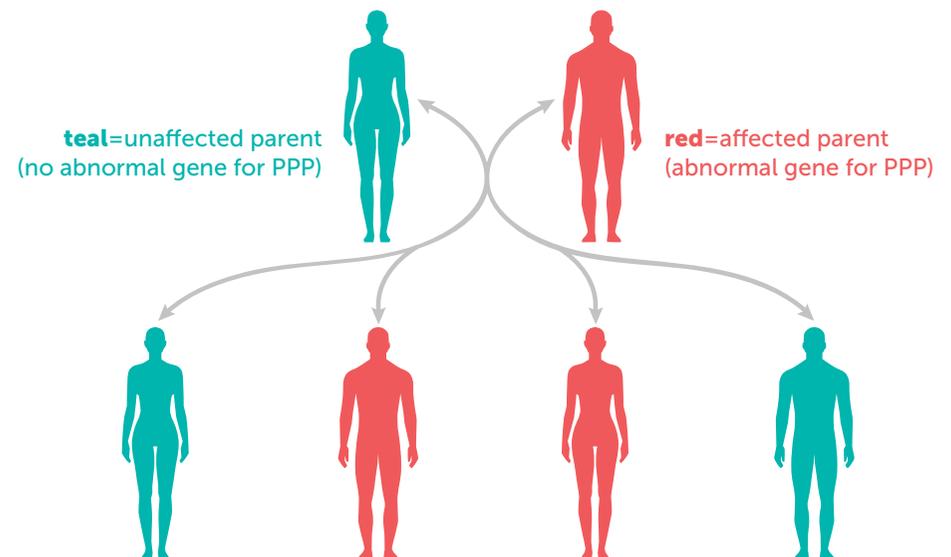
†One survey included 66 self-selected patients over the age of 41 who were diagnosed with PPP who sought support through the Internet, and the other survey was of 137 patients aged 19-84 who were diagnosed with Hyperkalemic Periodic Paralysis and were invited through the Internet or a healthcare institute to participate.

What Exactly Is PPP?

PPP is a rare genetic condition that can cause **episodes of extreme muscle weakness or temporary paralysis**.^{1,4} In the United States, about **4,000 to 5,000** people have been diagnosed with PPP.⁵

PPP is most often inherited, and children have a 50% chance of developing the disorder if one of their parents carries an abnormal gene. This is called "autosomal dominant."¹

How Is PPP Passed From One Generation to the Next?



Understanding PPP Episodes



Episode Frequency Varies Widely*

The number of episodes each person with PPP experiences can vary. In some people, episodes happen every day, while for others episodes occur weekly or monthly.^{1,6,7} In a survey of 66 patients diagnosed with PPP, 28% reported experiencing daily episodes. More than half (59%) of patients

reported experiencing weekly episodes, while only 11% of patients did not experience any episodes at all.³

How Long Can an Episode Last?

Just like the frequency of these episodes varies, so can the length of an episode. Most episodes last a few hours. However, in some cases, they can last for days.^{1,8}

Each person with PPP can experience episodes differently. Episodes could involve weakness that limits some activities, but more severe episodes can mean complete, but temporary, paralysis.^{2,4}

Muscle weakness usually affects the arms or legs, but can also affect many other parts of the body.²

*Based on a 68-question online survey (average age of respondents was 60 years).²

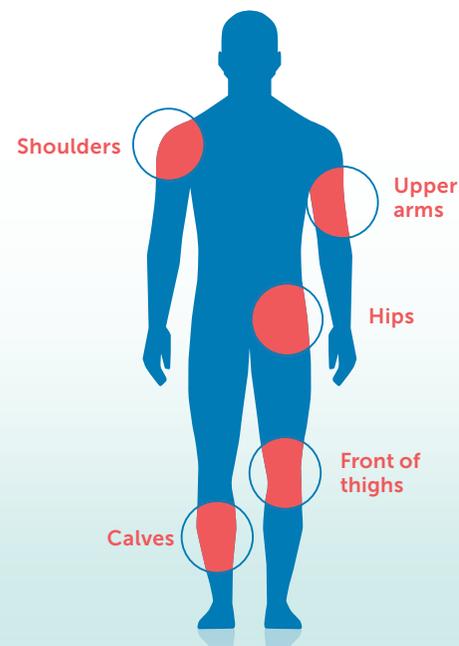


I usually became **paralyzed** in the middle of the night, so I would have to holler for my mom or sisters to help turn me because I would be in **so much pain**. I would have total feeling from head to toe but **couldn't move a thing**.

– Diagnosed PPP patient



What Muscles Can Be Affected During a PPP Episode?²



Episodes may also affect²:

- Lower back
- Hands
- Neck & throat
- Forearms
- Buttocks
- Chest
- Face & jaw
- Eyelids

Keep track of your episodes

A Primary Periodic Paralysis Daily Tracker & 3-Month Diary is available to help you monitor your episodes and identify triggers.

Download it now at www.PPPdiary.com

Recognizing the Impact of PPP

PPP Affects Patients' Daily Lives

The burden of PPP episodes is not only physical. Weakness, loss of energy, and stiff muscles can limit people's ability to participate in activities including social and family life, sports, and even school and work.²

Anxiety can also be a problem. People living with PPP often fear an impending episode and are worried about how others may look at them or pity them during an episode. This can lead to a cycle of continued stress, which can trigger or worsen an episode, which can lead to stress, and so on.²

Some symptoms may linger following an episode^{1,2}:

- Clumsiness
- Extreme fatigue
- Weakness
- Heart palpitations
- Muscle pain



In addition to commonly reported physical symptoms, **fear of episodes can cause anxiety.**²



At times, **PPP has affected me very badly**—it's affected the things I can or can't do. It's affected me mentally. It's affected my family. There's so many ways it's affected me.

— Diagnosed PPP patient



Permanent Muscle Weakness Is a Common Long-term Consequence of PPP

PPP may lead to progressive Permanent Muscle Weakness. **This is weakness that does not go away** and isn't associated with any specific episode. After suffering from PPP episodes for years, you may experience **muscle loss.**²⁻⁴ Permanent muscle weakness can limit your ability to move, impacting your work, social, and family lives.^{2,3}

Injuries resulting from PMW³:

In a survey, **67%** of patients with permanent muscle weakness reported **injuries serious enough to require medical care.** These included:

- Bruises
- Sprains
- Torn ligaments
- Bone fractures
- Concussion
- Internal bleeding
- Muscle pain



In two different surveys, more than **60%** of people with a history of PPP said that they had permanent muscle weakness.^{*2,3}

*One survey included 66 self-selected patients over the age of 41 who were diagnosed with PPP who sought support through the Internet, and the other survey was of 137 patients aged 19-84 who were diagnosed with Hyperkalemic Periodic Paralysis and were invited through the Internet or a healthcare institute to participate.

There Is More Than One Type of PPP

While PPP is very rare, the two most common types are Hyperkalemic (hy-per-kay-LEE-mik) Primary Periodic Paralysis and Hypokalemic (hy-po-kay-LEE-mik) Primary Periodic Paralysis.^{1,6,7,9,10} Less common types of PPP include Paramyotonia Congenita (para-mye-o-TOE-ne-ah kon-JEN-i-tah) and Andersen-Tawil (AND-err-son TAH-will) Syndrome.^{11,12}

All of these types of PPP cause extreme muscle weakness and/or stiffness that can impact several parts of the body.^{1,2,4,11,12}

<p>Hyperkalemic Primary Periodic Paralysis (also known as HyperPPP)^{1,7,9}</p>	<p>Hypokalemic Primary Periodic Paralysis (also known as HypoPPP)^{1,6,10}</p>
<p>In HyperPPP, there is usually an increase in potassium levels during an episode, although in some cases potassium levels do not rise above normal.</p>	<p>In HypoPPP, there is usually a decrease in potassium levels during an episode, although in some cases potassium levels do not drop below normal.</p>
<p>Paramyotonia Congenita (also known as PMC)^{1,11,13}</p>	<p>Andersen-Tawil Syndrome (also known as ATS)^{1,14}</p>
<p>Potassium levels in the blood may be normal, low, or high (high levels are most common) during episodes, and cause continuous muscle tensing that prevents the muscles from relaxing.</p>	<p>Potassium levels in the blood may be normal, low, or high (low levels are most common) during episodes, which also can involve an irregular heartbeat.</p> <p>Some people with ATS have certain physical features, such as low-set ears and a small lower jaw, that help point to a diagnosis.</p>

What Triggers a PPP Episode?

PPP episodes can happen at any time, often without warning. Sometimes, episodes are brought on by triggers, which can cause episodes to occur. The different types of PPP have some common triggers, but others may be unique to a specific type.^{1,4,9,10,13}

Triggers vary from person to person, and from one type of PPP to another.^{1,4,9,10,13}

- › Certain foods that have a lot of potassium or carbohydrates
- › Stress
- › Exposure to cold
- › Alcohol
- › Becoming chilled
- › Resting after exercise



All of my childhood I had **severe weakness and paralysis**. It was almost an everyday thing. I think it happened so often because **I didn't know what my triggers were**.

– Diagnosed PPP patient

If you're able, write down as much information about your episodes as possible to see if you can figure out a trigger. Some things to think about include: *Did you just eat something? Were you doing a specific activity? What time was it?*

Identifying what can trigger an episode can be very helpful when your doctor is trying to diagnose, treat, and manage your PPP.

The PPP Diagnostic Journey

Diagnosis Can Take Up to 20 Years

Unlike some medical conditions where a simple blood test can determine the source of symptoms, **PPP can be extremely difficult to diagnose**, taking up to 20 years in some cases, and can also be misdiagnosed.^{3,10} In the United States, many people with PPP have reported being misdiagnosed with other conditions, including cardiovascular disorders, or mental disorders such as depression, before receiving their diagnosis.^{1,2}

In order to make a diagnosis of PPP, your doctor will review your and your family's medical history, perform a physical exam, run some blood and other tests, and may order a genetic test.^{1,13}

Tests that help diagnose PPP¹



ECG/EKG—An ECG or EKG, short for electrocardiogram (ee-LEK-tro-CAR-dee-oh-GRAM), is used to detect abnormalities in the heart's rhythm.¹⁵



EMG—Short for electromyography (ee-LEK-tro-my-AH-grah-fee), EMG is used to record the electrical activity of the muscles to see if they contract and relax properly.¹⁶



CMAP—Compound muscle action potential, or CMAP, is also known as an exercise EMG and is used to record changes in muscle function and nerve activity after spreading the fingers (or raising the toes) against resistance.¹⁷



Genetic—This type of test involves collecting a sample of an individual's saliva or blood to look at the DNA.¹

What Is Genetic Testing?

- Genetic testing looks at the DNA for changes in genes to determine a possible genetic cause of a condition¹
- It is done by evaluating a blood or saliva sample that is collected at the patient's home or their doctor's office

Uncovering Periodic Paralysis: No-Cost Gene Panel Test

Strongbridge Biopharma[®] has partnered with Invitae, a genetic diagnostics company, to offer a program called *Uncovering Periodic Paralysis*. This **no-cost Periodic Paralysis gene panel test** is offered to those who have **episodic muscle weakness** or **temporary paralysis** associated with common triggers for Hyperkalemic or Hypokalemic Primary Periodic Paralysis and first-degree family members of diagnosed patients.

A no-cost genetic test can be ordered by your doctor at www.UncoveringPeriodicParalysis.com

A Negative Test Result Doesn't Rule Out a PPP Diagnosis

Genetic testing can confirm a diagnosis in about 70% of patients, but the remaining 30% of **patients may have a negative test result and still have PPP**.^{1,9,10} This is because genetic testing does not currently capture all possible changes in DNA that are associated with PPP. While research is ongoing, **your doctor can diagnose PPP in other ways**.

For full eligibility requirements, please visit:
www.UncoveringPeriodicParalysis.com/eligibility

Managing Life With PPP

Managing PPP often begins with the first step—receiving an accurate diagnosis. For many patients, the road to a diagnosis of PPP is a long journey. But, today, that journey could be shortened by taking advantage of the latest available information and resources.

It's important to understand PPP so that it can be managed moving forward.

Identifying and Avoiding Triggers Is Critical

- Record the triggers that caused an episode
- Work with your doctor to develop a plan to avoid triggers
- Remember that triggers are different for everyone, and the lifestyle modifications that work for one person may not work for another

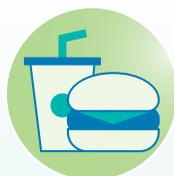
Managing episodes with a medical approach

Ask your doctor about treatment for PPP and a plan to avoid triggers.

Triggers of PPP vary from patient to patient

To help identify your triggers, use a journal or phone to track:

- Foods and drinks taken within 24 to 36 hours before episodes
- Exercise and activities that occurred within the same timeframe
- Changes in medication or missed doses of current medication²



Living With PPP: Frequently Asked Questions

Answers provided by a neurologist who treats patients with PPP

How does one balance the need for exercise with the tendency to trigger episodes?

Based on an individual's level of fitness, a low- to moderate-intensity exercise regimen is recommended. It's important to talk to your doctor before starting any exercise program.

Why is it so hard to avoid triggers, and why does it seem that the same foods and activities on different days can cause a different reaction in the body?

To be considered a trigger, the food, activity, or condition must always cause an episode—that is, if cold weather triggers an episode once, it would always trigger an episode. However, sometimes there are mild triggers that need to interact together to produce an effect. For example, cold weather may only affect someone after eating a certain food, such as a bowl of pasta.

How does stress negatively affect patients with PPP?

Mental stress affects patients with PPP in many different ways. Finding strategies to reduce mental stress is helpful.



The “up” side to this disease is that I’ve been able to meet and talk with other people who have similar experiences. When I was diagnosed, we didn’t have computers, so everything I learned was from books, and that was minimal.

So **having the opportunity to meet other people has been amazing.**

– Diagnosed PPP patient



PPA (Periodic Paralysis Association): A nonprofit charitable foundation founded to foster awareness of periodic paralysis, promote science-based information, and champion the interests of the community.

www.PeriodicParalysis.org



PPI (Periodic Paralysis International): A mission-driven, independent not-for-profit whose goal is to create successful partnerships among physicians, researchers, and patients to help speed up diagnosis and improve therapy.

www.HKPP.org



Inspire PPP Patient Community: A community online that’s designed to be a safe place to discuss numerous health topics and wellness.

PPP.Inspire.com



NORD (National Organization for Rare Disorders): A nonprofit patient advocacy organization dedicated to individuals with rare diseases and the organizations that serve them.

www.RareDiseases.org



MDA (Muscular Dystrophy Association): A nonprofit organization whose mission is to provide hope and answers to families living with diseases that take away muscle strength and mobility.

www.MDA.org



Genetic Alliance: A not-for-profit organization designed to give people tools to shape their own healthcare by providing resources for various conditions and diseases.

www.GeneticAlliance.org



Strongbridge CareConnection Makes Sure You're Getting the Support You Need

Strongbridge is committed to the PPP community by providing a wide range of **services and support to those living with PPP** and their family members. They include:



Patient education and support

- Information about Primary Periodic Paralysis
- Information about treatment
- Match up with a patient support advocate
- PPP Mentor Connect program



Community connection

- Links to events sponsored by advocacy organizations
- Online patient communities



Genetic testing

- A no-cost PPP gene panel testing program

While these services and the information contained in this brochure are designed to support those in the PPP community, they do not replace discussions with your doctor. Be sure to talk to your healthcare team if you have any questions about your diagnosis, health, or treatment.

Paving the PPPath

- › Work with your doctor to get an accurate diagnosis
- › Learn what triggers symptoms
- › Develop a plan to avoid your triggers
- › Follow a diet and lifestyle that minimize exposure to triggers
- › With the help of your doctor, find the right treatment plan for your PPP

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