

# Pupillometry Exam

## Your Comprehensive Guide

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**Pupil reaction can be revealing.** A pupillometry exam can provide key insight for patients with neurological conditions, injuries, or optic neuropathies. This tool can assess the health of the optic nerve, brainstem, and autonomic nervous system through objective measurements of the pupil's reflexive response to light. In seconds, you can gain non-invasive insight into your patient's neurological health and identify health issues ranging from manageable conditions to medical emergencies.

The automated pupillometry exam becomes even more efficient when performed with Carrot. Learn how you can make the most of the pupillometry exam with Carrot and gain the most accurate insights possible.

### [Pupillometry Test Overview](#)

The [pupillometry exam](#) is designed to measure a patient's pupillary reaction to light in a highly controlled and objective manner. Through this exam, an automated pupillometer emits a pulse of light and then records the pupil's response to the stimulus. It measures pupil size, the pupil light reflex, energy of the pupil movement, relative apparent pupillary defects, and other key details. The test duration can vary depending on the tools used, the patient's cooperation, and pupil response.

Pupillometry is used in both ophthalmology practices and critical care settings. Traditional manual pupillary assessment using a [flashlight](#) may provide some insight, but it's not quantifiable and is highly subjective. With a specialized pupillometry exam, you can observe and measure the pupil's response. This way, you can diagnose and treat neurological conditions with better accuracy.

Using traditional pupillometers can require a lengthy setup process to achieve proper fixation. It can also be an expensive investment if you only conduct this test occasionally. Carrot is a much more affordable choice for ophthalmology and optometry practices. This virtual reality headset is designed to be comfortable for patients to wear and automatically adjusts to deliver the most precise data possible, enabling you to make faster, more accurate clinical decisions.

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## Academic references and clinical validation



Pupillometry is extremely relevant and **growing** in ophthalmology, neurology, oncology, and even human behavior. **XR and VR** are helping expand this technique's uses and accessibility.



**Research shows** that the pupillary light reflex is especially helpful in assessing patients with TBI and helping drive better outcomes.



Pupillometry can even provide insight into general neurological behavior. **This study** found that pupillometry is a reliable and time-sensitive measure for sustained attention.

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**No strings attached.**

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## The Pupillometry Exam at a Glance

In its simplest form, the pupillometry exam measures the pupil’s response to light stimulation. Historically, this was done with a flashlight, but today, automated pupillometer exams collect a detailed and objective analysis of the pupil’s responses. It’s non-invasive, but highly sensitive and can detect subtle abnormalities in the autonomic nervous system, optic nerve, and brainstem — even before symptoms become apparent. It’s extremely useful, but it is limited. Pupillometry doesn’t provide insight into visual field changes, visual acuity, or any non-neurological conditions.

## Pros and Cons of Automated Pupillometry

We know the automated pupillometry is efficient, useful, and widely used, but there are pros and cons to incorporating this test into your routine.

PROS	CONS
Collect objective data with precise, quantifiable measurements of pupil reactions.	Pupillometry is limited in scope. This test does not provide information about macular diseases, peripheral visual field defects, or non-neurological conditions.
Pupillometry is sensitive to subtle changes in the nervous system’s pathways. This factor helps support early detection of neurological and autonomic disorders.	Patient cooperation may be a challenge, especially using traditional pupillometers with younger patients and those who are easily distressed or fatigued.
Neurological health is traditionally challenging to analyze, but this non-invasive test is a simple way to glean information and make quick assessments.	Patients’ medications, anxiety, or natural pupil differences can interfere with results.
The simplest pupillometry exams take only seconds to conduct.	Using old-fashioned methods will not provide detailed information, and specialized pupillometers can be expensive.

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## List of Ocular Diseases Monitored and Diagnoses Identified by Pupillometry Testing

<b>Optic Neuropathy</b>	The pupil's response can indicate early <a href="#">optic nerve dysfunction</a> . Conditions like ischemic optic neuropathy or optic neuritis can cause abnormal pupil reactions that are detectable with pupillometry.
<b>Traumatic Brain Injury (TBI)</b>	TBI can disrupt neurological pathways that control pupil reactions. Pupillometry is highly sensitive to these changes, so with quantifiable data, you can assess the severity of the injury, track recovery, and better predict outcomes.
<b>Autonomic Dysfunction</b>	<a href="#">Autonomic dysfunction conditions</a> affect involuntary physiological responses, including the pupil's reflexes. Pupillometry detects these early signs, that might otherwise go unnoticed in a routine exam.
<b>Multiple Sclerosis (MS)</b>	MS can damage nerve fibers and cause optic neuritis, which often presents with abnormal pupillary responses. Pupillometry helps track changes in the pupil's reactivity as part of monitoring disease progression.
<b>Horner's Syndrome</b>	<a href="#">Horner's syndrome</a> is a rare condition that disrupts sympathetic nerve pathways, causing abnormal pupil constriction and eyelid drooping, which you can identify using precise pupillometry.
<b>Adie's Pupil</b>	Another uncommon condition, <a href="#">Adie's pupil</a> , is characterized by pupils that are unequal in size or don't respond normally to light. Pupillometry can measure the parasympathetic nerve damage and help achieve this diagnosis.
<b>Other Conditions</b>	Pupillometry can also be used to monitor or diagnose: Migraine-related pupillary changes • Parkinson's disease • Brainstem lesions • Alzheimer's disease • Stroke

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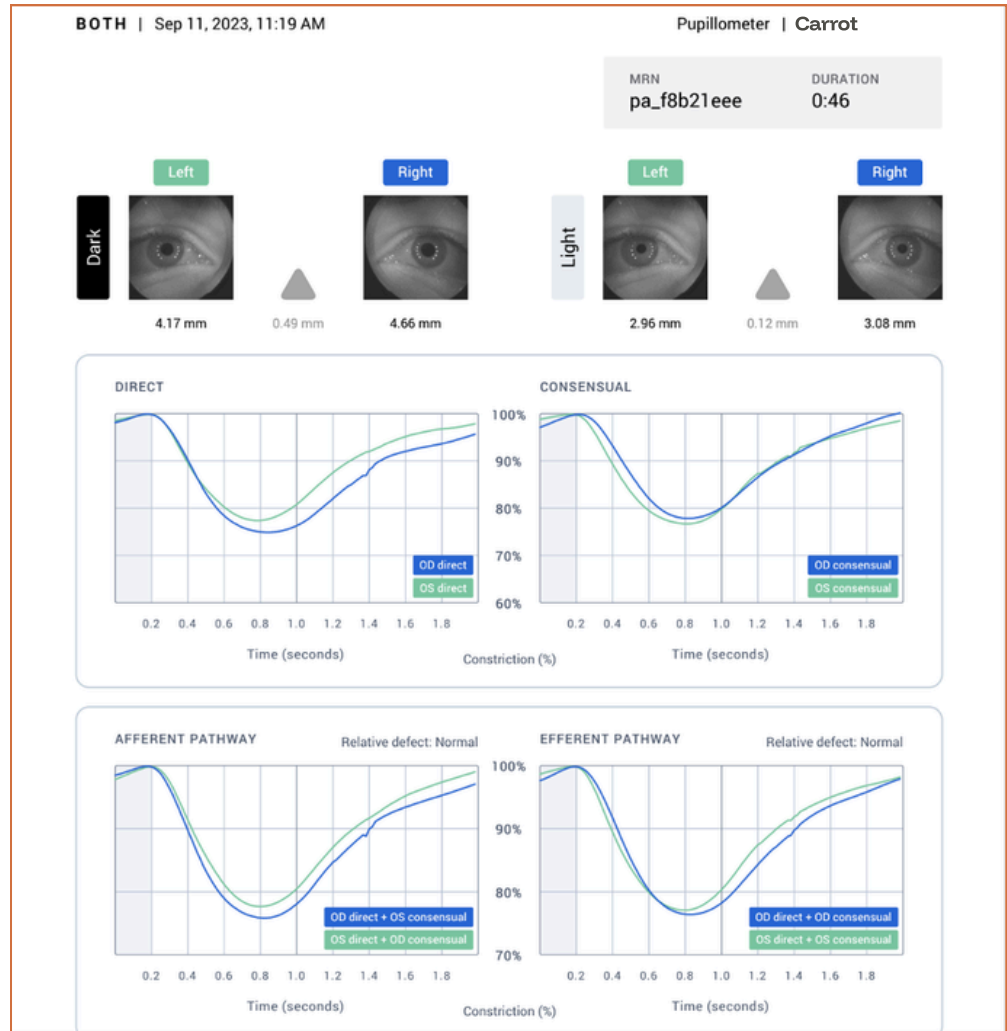
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## Pupillometer Device Cost: What to Expect

When evaluating your pupillometer device for ophthalmology, price options can vary widely depending on the technology, features, and clinical needs. At the most basic level, a manual flashlight test used for Pupillary Light Reflex assessments is inexpensive but lacks objectivity, quantifiable data, and recorded documentation.

On the higher end, dedicated handheld or desktop pupillometer devices may offer more advanced analytics but often come with a high upfront cost — sometimes reaching several thousand dollars — requiring a significant upfront investment and ongoing maintenance costs.

Carrot's VF3 Pro offers an accessible alternative: a virtual reality-based device that features pupillometry within a comprehensive vision testing suite. This solution is available through [an affordable monthly subscription model](#), significantly lowering the barrier to entry for ophthalmology and optometry practices that want to add automated pupillometry to their diagnostic toolkit without a significant capital investment.

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## Billing and Coding for Pupillometry

The updated CPT code for pupillometry is 95919. This code is used specifically for automated quantitative pupillometry exams, and you must interpret both unilateral and bilateral results. With Carrot, this data is instantly uploaded to your EHR to help expedite interpretation, treatment, and billing.

The [Medicare Physician Fee Schedule \(MPFS\)](#) indicates reimbursement between \$6 and \$20, depending on your location, setting, modifiers, and other practice factors.

### When is pupillometry testing required?

Pupillometry is essential for patients with suspected or diagnosed neurological conditions, including traumatic brain injury, optic neuropathy, and autonomic dysfunction. It's not usually part of routine screenings.

For patients with known neurological condition, regular monitoring and pupillometry measurements can help track progression, guide treatment decisions, and measure the effectiveness of current interventions. Pupillometry is also useful for monitoring patients with high-risk conditions, such as those recovering from brain injury or surgery.

### Is pupillometry required for driver's licenses?

No, the pupillometry exam isn't a requirement for standard driver's licenses or CDLs. However, for patients with neurological conditions that affect pupil response, like TBI, MS, or optic neuropathy, it's important to assess their ability to drive safely. The pupillometry exam cannot answer that question, but can help inform treatment.

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## Start Conducting Pupillometry Exams with Carrot

The pupil's response to light can reveal abnormalities that might otherwise go unnoticed. This quick, painless, and insightful exam provides a unique perspective on patients' neurological health. Monitoring pupil response has been a key diagnostic tool for [centuries](#), and now it's extremely precise thanks to virtual reality. Carrot's Pro subscription includes a pupillometer setting, allowing you to collect highly accurate, quantifiable data and provide more targeted treatment to patients with neurological conditions.

## Ready to get started?

Schedule a demo or begin your 30-day free trial of Carrot to offer an exceptional eye exam experience in your practice.

[Book a demo](#)

[Start your 30-day trial](#)



Questions? Contact [sales@carrot.io](mailto:sales@carrot.io) talk to a Carrot expert today.