AVULUX®
Migraine & Light Sensitivity Lenses

Elevating Patient Care Through Migraine Sub-Specialty

A Guide for Optometry Practices

About Migraine & Light Sensitivity

Migraine is a genetic, neurological disease that affects nearly 48 million people in the United States – as many as 1 in 5 patients visiting your practice. Migraine has significantly greater prevalence than many common sub-specialties, and represents an opportunity for ODs to serve in the frontline of care for patients living with this debilitating condition.

90%

of people with migraine experience light sensitivity during a migraine attack.[1]

40%

of people living with migraine are constantly light sensitive, even when they're not having a migraine attack.[2]

30-60%

of migraine attacks are triggered by light or glare.[3]

Migraine affects more than one billion people worldwide (14.7% of people)[4] and is the sixth most disabling disease in the world, according to the World Health Organization.[5]

Migraine is commonly misunderstood to be a simple headache. There is no cure for migraine disease, and a severe, throbbing headache is just one symptom of a migraine attack. People with migraine experience migraine attacks (or migraine episodes) that can be triggered by various external and internal factors. While researchers continue to research and understand migraine disease, the only option for people with migraine is to manage symptoms and triggers.

Specific wavelengths of light have been shown to trigger migraine attacks and worsen migraine-related headache pain. Since 2010, research has identified specific culprit wavelengths of light, leading to a new hypothesis around how to effectively manage light sensitivity in people with migraine.

A Need for Proven Options

Up until 2019, options available to people with severe light sensitivity were scarce. They ranged from dark sunglasses, which could cause someone chronic dark adaptation (meaning eyes become adapted to darkness and may become even more sensitive to light) if used continuously,[1] to a blue-blocking orange or red lens called FL-41, originally created to reduce the impact of the flickering of fluorescent lighting (hence the FL).

Prior to the Avulux studies, eye care professionals didn't have objective clinical evidence that had achieved clinical and statistical significance to guide their migraine and light sensitivity optical recommendations to patients with photophobia (extreme light sensitivity). Physicians also faced this issue, even though light sensitivity is so common. In a survey of more than 6,000 migraine patients, 49% selected light sensitivity as their primary, most bothersome symptom.[6]

Outside of Avulux's studies, the studies that had been performed on optical filtration to manage light sensitivity in subjects with migraine didn't achieve both clinical and statistical significance. They also didn't provide a framework or guideline for future manufacturers to recreate the filtration properties of the study lenses.

Migraine and light sensitivity patients were left with non-evidence-based choices and with the burden of finding a light sensitivity management solution for themselves, with options that offered sub-optimal light filtration or were leaving them chronically dark adapted.

There's been an increase in consumer and business interest around blue light glasses and filters. Search the web and you'll find a number of different vendors selling these lenses and add-ons. Certain niche blue light glasses vendors may even incorrectly state that their lenses relieve migraine pain, lacking the required clinical research to support the claim.

Avulux – An Optical Filter Backed by Clinical Evidence

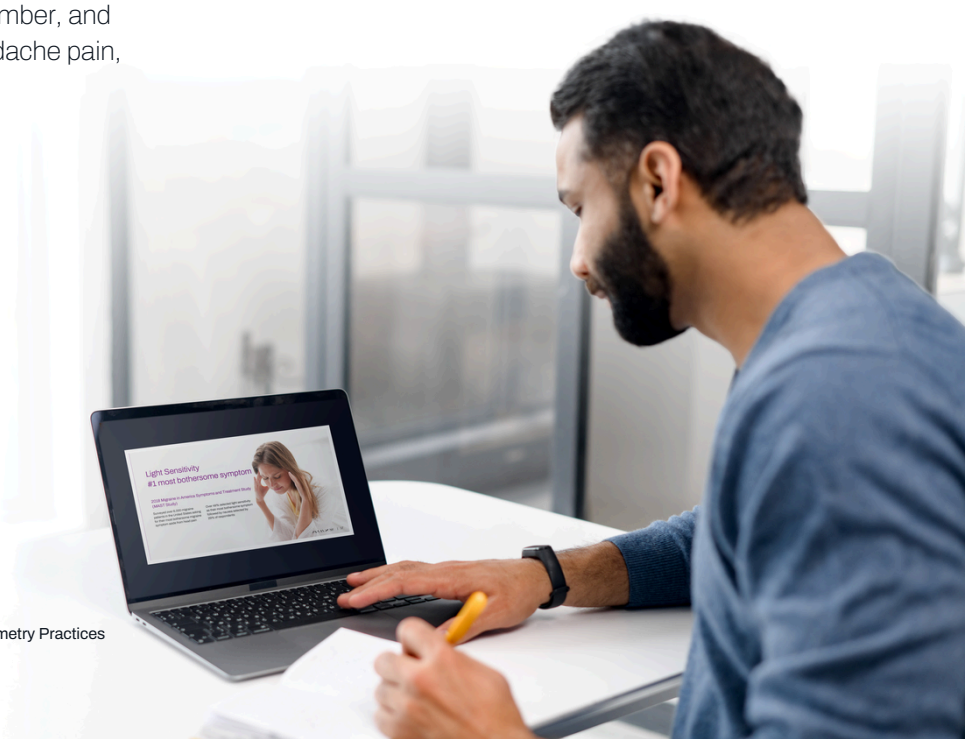
The Avulux lens is a patented multi-band precision optical filter that filters up to 97% of the most harmful blue, amber, and red light while allowing up to 70% of soothing green light through.

A first for any optical lens, the Avulux precision optical filter proved its efficacy when compared to placebo in an independent, randomized, double-blind, placebo-controlled study – the highest scientific standard.

Recent research[7,8] identified the pathways through which light causes pain while also showing that specific blue, amber, and red wavelengths of light can increase migraine headache pain, and green light could soothe it.

Avulux lenses precisely filter harmful blue, amber, and red wavelengths of light while allowing a narrow band of beneficial, soothing green light through. Avulux lenses do this without distorting color perception, while remaining safe to wear indoors or outdoors.

For the first time, patients, physicians, and eye care professionals have the choice of an independently proven lens designed and formulated specifically to manage the impact of light.



Migraine and Workplace Impact

Migraine is widespread and often strikes during an individual's most productive years, negatively impacting professional performance, workplace relationships and productivity.

Migraine also carries stigma, often caused by a lack of understanding of the condition on the part of coworkers, family, friends, doctors or health insurance agencies.

A survey of 200,000 U.S. workers indicated that only 22% of employers viewed migraine as a valid reason for missing work.[9]

Furthermore, a survey of 2,000 people without migraine but who knew at least one person with migraine, believed that migraine symptoms are exaggerated (32.4%) or that migraine was self-induced by unhealthy behaviors (35.5%).[10]

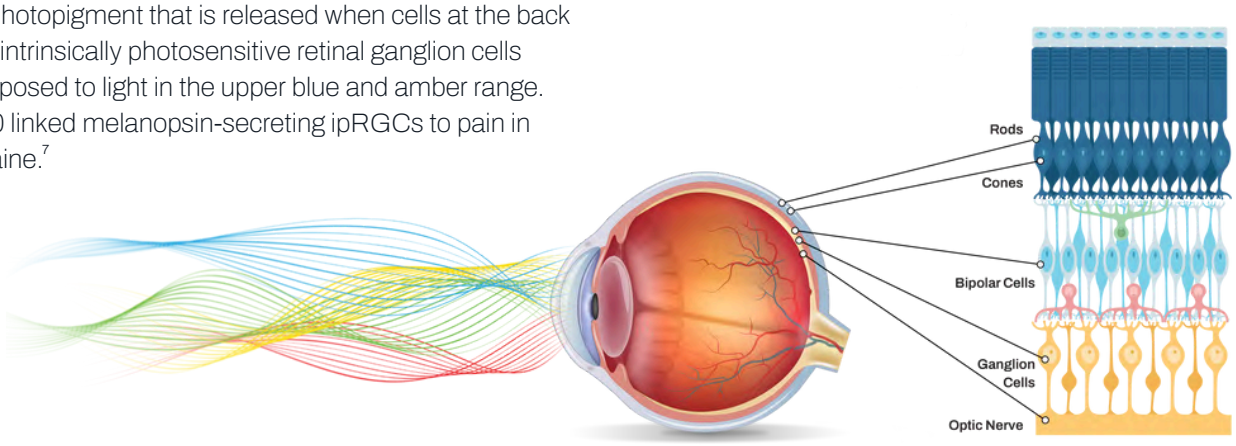
This perception extends to thinking that people living with migraine often hide their condition (39.1%); that migraine negatively impacts their coworkers (29%); or that migraine is used as an excuse to avoid commitments (31.1%).[10]

As a result, more than half of the workers who miss work due to headaches do not disclose the true reason for their absence.[11]

For workers living with migraine, the negative effects of this stigma can include discrimination, loss of status and relationships, prejudice, presenteeism and reduced pay.

The Link Between Light and Pain

Melanopsin is a photopigment that is released when cells at the back of the eye, called intrinsically photosensitive retinal ganglion cells (ipRGCs), are exposed to light in the upper blue and amber range. Research in 2010 linked melanopsin-secreting ipRGCs to pain in people with migraine.[7]

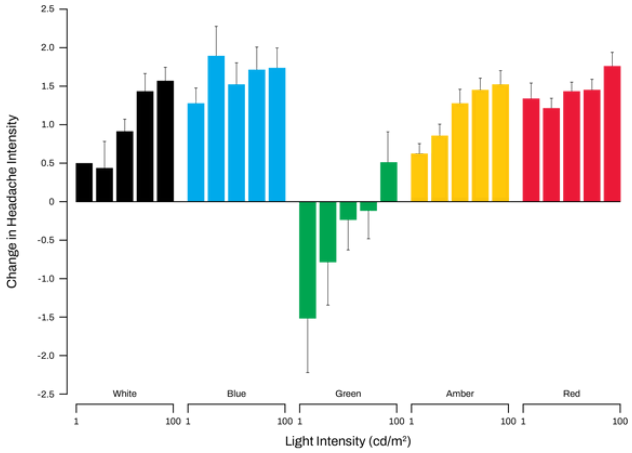


Cone-Driven Retinal Pathways

In 2016, 69 migraine patients were assessed during an untreated migraine attack to determine the impact of light on the intensity of their headache, throbbing, muscle tenderness, and cephalic areas affected by pain.

Harvard researchers placed these subjects into a dark room and exposed them to varying colors of light. Findings: White, blue, amber, and red light all increased migraine headache pain. Low-intensity green light reduced pain.[8]

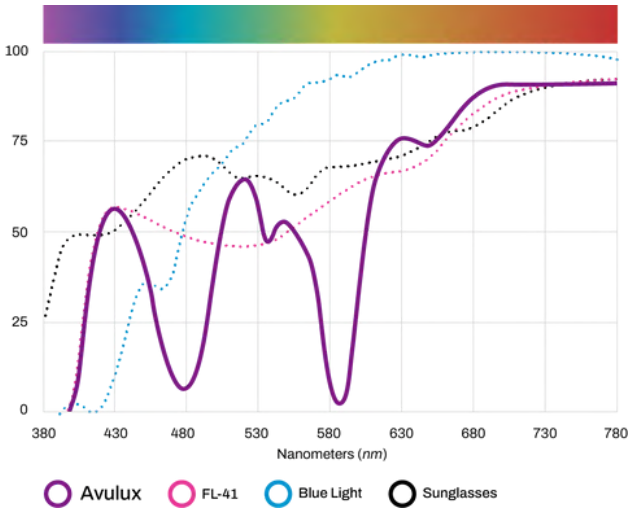
The researchers propose that migraine photophobia can originate in cone-driven retinal pathways and is relayed through light-sensitive thalamic neurons (pain neurons) to the cortex.



Avulux Lens Precision Filtration

The Avulux Migraine & Light Sensitivity Lens uses a patented nano-molecular technology to selectively filter harmful wave-lengths of light while allowing soothing green light through.

This precise filtration targets wavelengths that
(a) induce melanopsin activation; and,
(b) generate larger electrical signals that can lead to pain via the optic nerve. Wearing Avulux lenses before and during any exposure to harsh light may help those living with migraine.



The Only Clinically Proven Lens For Patients Living With Migraine And Light Sensitivity

In 2020, a double-masked, randomized, placebo-controlled study was conducted by an independent clinical research organization to compare the benefits of wearing Avulux lenses versus clear placebo lenses on subjects with episodic migraine.

The results show that, if applied within the first hour after the onset of a migraine attack, and if no abortive medications were taken, that Avulux was both statistically and clinically superior to the placebo lens. This is the highest scientific standard of efficacy.

How Avulux Works

Avulux lenses precisely filter up to 97% of the harmful blue, amber, and red wavelengths of light while allowing through up to 70% of soothing green light.

Avulux Lens Availability

	Base	Design
Plano	2, 4, 6, 8	–
Semifinished	2, 4, 6, 8	Single Vision, Progressive*
Chemistrie Avulux	4	–

*Avulux is vision correction design agnostic and can be produced based on the lens design offerings of individual Avulux Lab partners.

Avulux Lens Layers

Anti-Reflective Coating (Optional)

Durable Anti-Scratch Hardcoat

Avulux Nanomolecular Precision Filtration Technology

The Evolution of Eye Care for People Living with Migraine & Light Sensitivity

2011

Research & development into a next-generation 480nm precision filter. Lens patent filed by neuro-ophthalmologist and optical engineer at University of Utah.

2015

Clinical study performed to establish proof of efficacy.

2017

2016 study published. Began improving lens design with additional filtration properties for improved efficacy, color neutrality, and clarity.

2019

Launched Avulux Migraine & Light Sensitivity Lenses (Non-Prescription).

2022

Launched Avulux Migraine & Light Sensitivity Lenses (Prescription). The only clinically proven lens for people living with migraine and light sensitivity.

2015

Using thin-film technology, prototype narrow-notch precision filtration lens created.

2016

Clinical trial comparing 480nm precision filter versus 620nm filter performed using Headache Impact Test (HIT-6). Clinical significance achieved using both filters.

2017

Using nano-molecular technology, current Avulux lens created.

2020

Independent, double-masked, randomized placebo-controlled clinical trial performed. Avulux achieved clinical and statistical significance when compared to a clear placebo for patients with episodic migraine.

Why Choose Avulux for Patients?

No Side Effects

Avulux lenses are clinically proven and may help patients living with migraine by filtering harmful light, without any negative side effects.

Does Not Distort Color Perception

Avulux lenses do not distort color perception, so patients can manage light comfortably without affecting their quality of life.

No Recurring Costs

Unlike migraine medication or other treatments that need to be replenished frequently, patients won't face ongoing costs with Avulux lenses.

Multi-Use Lens

Avulux lenses can be worn indoors and outdoors without causing chronic dark adaptation.

Complementary

Avulux lenses are a safe complement to any migraine medication or medical device.

Maximizing the Benefits of Avulux Lenses

The goal of wearing Avulux is to help patients living with migraine by managing light to reduce its impact on their daily life. Success with Avulux is achieved when a patient can perform activities that they previously struggled with prior to wearing the lens.

Avulux should be worn continually if patients live with chronic migraine or experience continuous light sensitivity.

Patients should wear Avulux during any trigger activities such as screen time or under harsh lighting.

Or at the onset of a migraine attack or aura and when experiencing light sensitivity.

Note: Due to Avulux's precision filtration properties, the lens is not suitable for driving per the ISO 12312-1:2013 standard for glasses.

Avulux – An Innovation in Patient Care

Light is a key migraine trigger, and light sensitivity is the most bothersome migraine symptom[6] aside from pain. Fortunately, the research conducted since 2010 has allowed for an understanding of how light can cause people pain and set a pathway through which an advanced optical solution could be engineered.

Through extensive optical research and development, and independent, objective, clinical trials, Avulux lenses were engineered and have shown clinical and statistical significance when compared to placebo in wearers with episodic migraine. Avulux lenses are the only lenses proven at this highest clinical standard and may help people living with migraine.

Patients, physicians, and eye care providers can now feel confident in Avulux lenses as a safe, effective, and independently validated tool.

Features	Avulux	FL-41	Sunglasses
Precision Optical Filter	Multi-Band	Single-Band	✗
Neutral Color Rendering (does not distort how you perceive color)	✓	✗	Some Lenses
Filters up to 85% of harmful blue light	✓	Some Lenses	✗
Filters up to 97% of harmful amber & red light	✓	✗	✗
Allows in over 70% of soothing green light while filtering harmful light	✓	✗	✗
Patented	✓	✗	✗
Through an independent clinical trial: Achieved clinical and statistical significance when compared to placebo with a population of subjects with episodic migraine	✓	✗	✗
Effective light management indoors or outdoors with the same lenses	✓	✗	✗

References

1 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5606068/#CR10
2 https://pubmed.ncbi.nlm.nih.gov/2793458/
3 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3485070/#R28
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10 https://headachejournal.onlinelibrary.wiley.com/doi/10.1111/head.13549
11 https://pubmed.ncbi.nlm.nih.gov/30739216/

Intended Use: Avulux Glasses, which absorb specific wavelengths of light, may, as part of a healthy lifestyle, help people living with migraine. Avulux Glasses are marketed pursuant to FDA's policy for general wellness tools, and are not FDA-cleared or approved to treat, prevent, or cure any disease or disorder.

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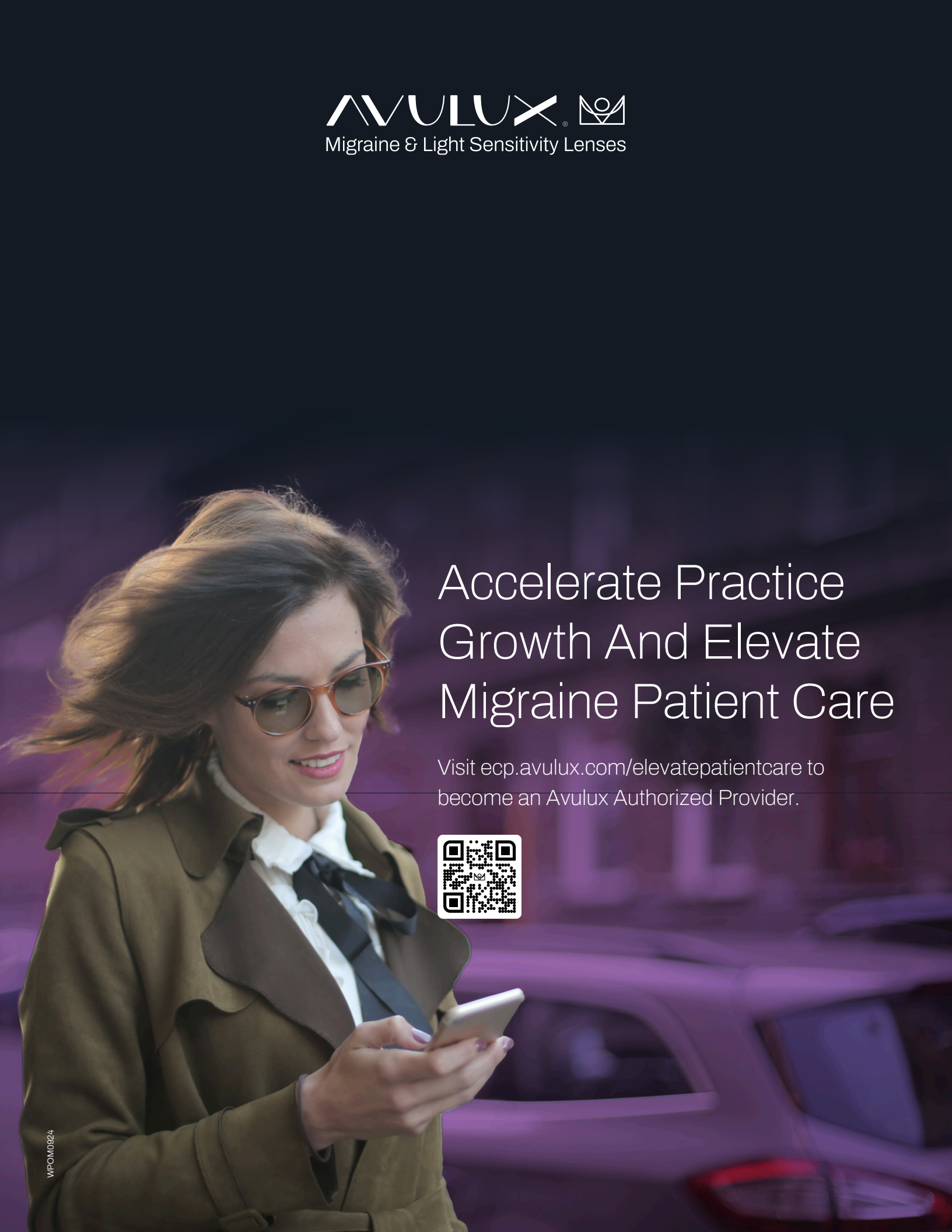

Accelerate Practice Growth And Elevate Migraine Patient Care

Visit ecp.avulux.com/elevatepatientcare to become an Avulux Authorized Provider.

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