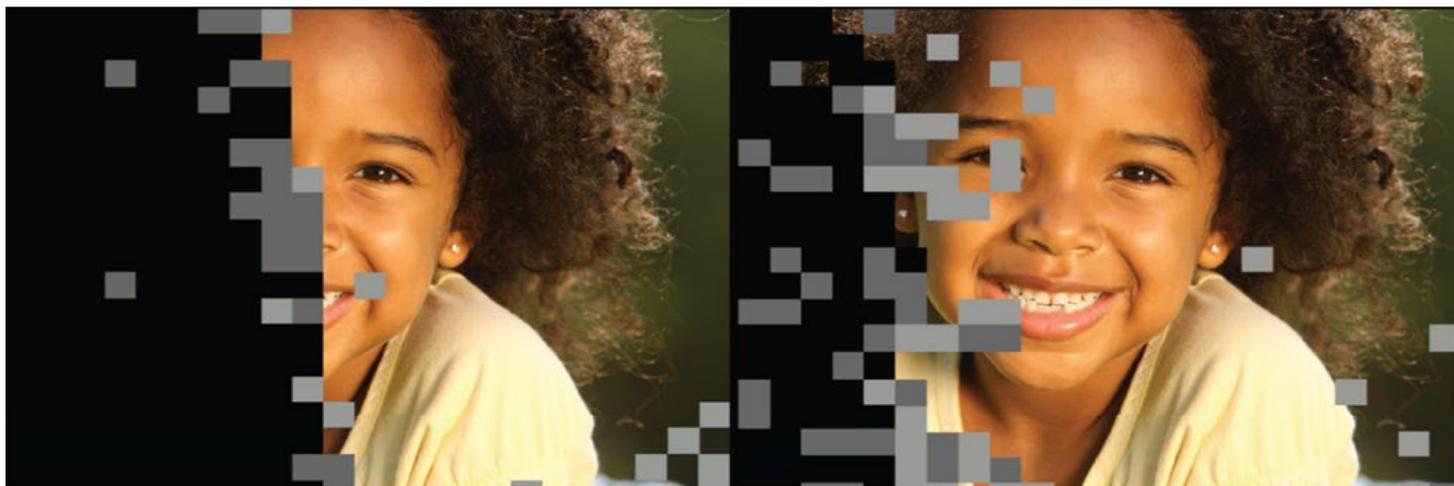


Link to Webinar:

[https://www.dropbox.com/s/nmtt8zj5c5eyx4e/Support%20Group%20PPT%20Webinar%20Presentation%20Video\\_NEE%20APPROVAL.wmv?dl=0](https://www.dropbox.com/s/nmtt8zj5c5eyx4e/Support%20Group%20PPT%20Webinar%20Presentation%20Video_NEE%20APPROVAL.wmv?dl=0)



# Stroke & Vision Loss



In partnership with:



Hello, my name is Charles and on behalf of NovaVision I would like to thank you for joining us on our mission to improve the quality of life and bring awareness to anyone with a visual deficit caused by a stroke or other brain injury.

Our following presentation will cover:

- What causes vision deficits after a stroke?
- The types of vision loss
- What is Neuroplasticity?
- And lastly, I will introduce you to several recovery options.

## Vision Deficits After Stroke Are Very Common

- On average, someone in the U.S. has a stroke every 40 seconds.
- About 610,000 of these are first or new strokes. About 185,000 strokes—nearly one of four—are in people who have had a previous stroke.
- About 87% of all strokes are ischemic strokes, when blood flow to the brain is blocked.
- Although stroke risk increases with age, strokes can—and do—occur at any age, 34% of people hospitalized for stroke are younger than 65 years.\*
- According to stroke.org, up to 66% of people who suffer from a stroke experience changes to their vision. 20% experience a permanent Visual Field Deficit.



Following a stroke, you might experience problems with your vision, but you are not alone.

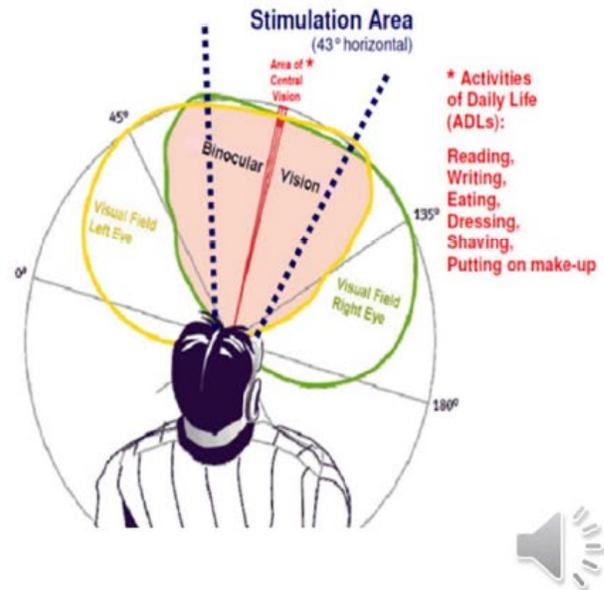
**On average someone has a stroke every 40 seconds and about 610K are first or new strokes.**

Out of the approximate 795 thousand people that have a stroke each year, according to stroke.org, 66% will experience changes to their vision and 20% will have a permanent visual field deficit.

# What Causes Vision Deficits After Stroke?

Damage caused to specific regions of the visual cortex or its connecting neural network.

Typically, the loss of vision is due to damage that has been done to that part of the brain that processes visual information which is transmitted to it using one's eyes as the conduits.



## What Causes Vision Deficits After Stroke?

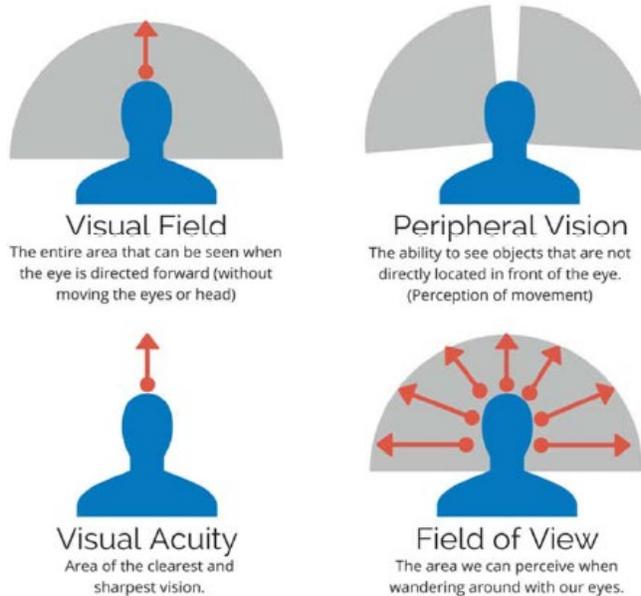
Before we get into this, I would like to talk a little bit about how our vision depends on two things. Having a healthy eye to receive visual information and having a healthy brain to interpret and process that information. Our eyes deliver information to various parts of the brain. The nerves in the eye detect light and travel from the eye through the brain, to the occipital cortex at the back of the head. This allows us to see a picture of the world around us.

So when you have a stroke, vision loss is caused by damage of the blood vessels which supply the nerve pathway as it travels through the brain. Most strokes affect one side of the brain. However, because the nerves from each eye travel together in the brain, both eyes are affected, so for example, if the right occipital lobe is damaged, the left side vision in each eye may be affected. It is rare for both sides of the brain to be affected by stroke but when it does happen it can result in blindness. If you look at the image on the right, you can see that we have two forms of vision, central and peripheral, the area shaded in pink, is the central vision which is used to look straight at objects and it covers 10 degrees of our vision. As you can see from the image, we use our central vision for activities such as reading, writing, eating and many more activities of daily life

Our peripheral vision provides information about the rest of the world around us.

Source: <https://strokefoundation.com.au/about-stroke/help-after-stroke/strokeresources-and-fact-sheets/vision-loss-after-stroke-fact-sheet>

# Vision Impacted After A Stroke



So when a person suffers a stroke, their vision can be impacted in several ways... Their entire visual field may be affected (which covers the central and peripheral vision) – demonstrated on the top left image

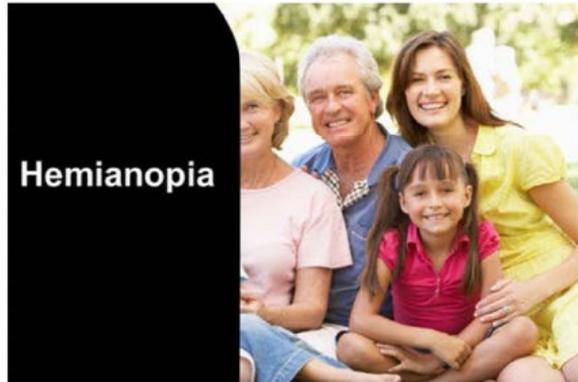
Or only the peripheral vision may be affected – represented by the top right image  
Their visual acuity which is commonly referred to as the clarity of vision may also be affected, this is the area of the clearest and sharpest vision – this is the bottom left image.  
Or their entire field of view may also be impaired; this is the area we can perceive when wandering around with our eyes.

# Types Of Post-Stroke Vision Deficits

## Hemianopia

Stroke victims with Hemianopia experience blindness in one half of their visual field.

If you have suffered from a stroke that occurred in the left hemisphere of your brain, your ability to see properly in the right visual field of each eye may be negatively affected. On the other hand, if you have suffered a stroke in the right hemisphere of your brain, the left visual field of each eye may be affected.



There are many types of visual field loss, but the most common is a condition where you can see only the right half or the left half of the world out of each eye. It is called **homonymous hemianopia** and it affects two thirds of people with visual field loss following stroke. This happens when a stroke occurs at the back of your brain.

# Types of Post-Stroke Vision Deficits

## Quadrantanopia

This is similar to hemianopia but the loss of vision occurs in a quarter of your visual field, as opposed to half.



Another type is **Quadrantanopia**, which refers to vision loss affecting a quarter of your visual field, as you can see on the image on the screen, this is an example of an upper right side **quadrantanopia**.

# Types of Post-Stroke Vision Deficits

## Scotoma

This condition refers to spotty vision or smaller area of blindness than hemianopia or quadrantanopia.



A **scotoma** is a blind spot in your vision. Also referred to as spotty vision, the spot may be in the center, or it may be around the edges of your vision.

# Types of Post-Stroke Vision Deficits

## Tunnel Vision

This condition is fairly self explanatory, referring to a loss of peripheral vision that mimics looking through a tunnel.



Tunnel Vision, is when you lose visual acuity in the peripheral visual fields while retaining visual acuity in the central regions. The vision can be considered to be constricted and concentrated in the central area, as when one is inside a tunnel looking out

## 3 Recovery Options

1. Vision Restoration
2. Vision Compensation
3. Substitution



Now that we have identified what causes vision loss and the different types of vision deficits following a stroke or other brain injury, I will now go over several recovery options. People with a visual deficit following their stroke or other brain injury may be told that there is nothing that can be done, but recent findings show that the adult brain actually has remarkable plasticity that is retained throughout your lifetime. Since this discovery, therapies for both motor and visual impairments have been developed and have been shown to lead to significant recovery of lost functionality. The following therapy options will cover Restoration, Compensation and Substitution.

# The Concept of Neuroplasticity

- Your brain's natural ability to compensate for injuries and adjust to deal with these changes by creating new neural pathways and adapting as needed.
- Some networks in the brain are duplicated and Neuroplasticity enables the activation and usage of alternative routes to process information.
- Researchers studying in brain based healing methods have discovered that changes benefiting one person may be detrimental to another, therefore the brain training apps promising benefits to all may not indeed be effective for all. It is imperative that any neuroplasticity treatment must be tailored and monitored to fit each patient.

Neuro + Plasticity  
(Brain) (Changeable)



The process that the brain goes through to regain these lost functions, such as lost vision, is called Neuroplasticity – Neuro meaning BRAIN and Plasticity meaning CHANGEABLE. If harnessed and carefully guided, plasticity can enhance and speed up recovery and restore lost function.

Ultimately, the theory behind Neuroplasticity is that your brain will continue to build new neural pathways and heal as long as it is challenged by new information in a stimulating environment. Exercising Neuroplasticity won't heal the damaged parts of the brain, but it does allow for recovery by essentially re programming your brain; you will be able to perform a function that was previously managed by a damaged area of the brain by now utilizing an undamaged area of your brain.

It is imperative that any neuroplasticity treatment must be tailored and monitored to fit each patient.

# Recovery Options: Vision Restoration



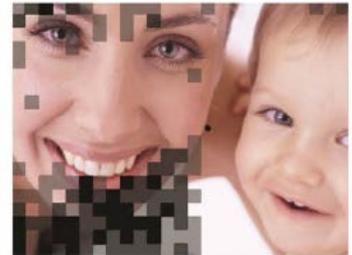
## Vision Restoration Therapy (VRT)

- VRT is the only FDA cleared restoration therapy for the treatment of vision loss as a result of stroke or other brain injury, and is designed to provide actual improvement in the range or sensitivity of the patient's field of vision.
- VRT is clinically supported by years of research and studies, including a 302 patient study in which notable improvements were seen in over 70% of the patients.
- VRT requires a prescription from a physician.
- Therapy is personalized for the vision deficit and updated monthly.
- Therapy can be done at home on a computer. No surgery or other medical intervention is needed.
- Improvement does not depend on how long ago their vision loss occurred (Efficacy is independent of lesion age).

Pre VRT



Post VRT



The reason why I discussed neuroplasticity on the previous slide is because it plays a big role in the development of Vision Restoration Therapy (VRT).

VRT is the only FDA cleared restoration therapy for the treatment of vision loss due to a stroke or other brain injury, it is also supported by many years of research and studies, including a 302 patient study which notable improvements were seen in over 70% of patients.

During a therapy session, the patient focuses on a central fixation point on a computer screen, light stimuli is then repetitively presented in the transition zones between the intact and damaged visual field and these are the areas that have the highest potential to improve.

And one of the many great things of this therapy is that it can be done at home on a computer, it does require a prescription from a physician whether it's an optometrist, ophthalmologist, neurologist and each patient's therapy is personalized to address their unique needs and updated monthly.

If you look at the pre VRT image on the left, the black area represents the patients vision loss, and if you look to the post VRT image to the right, you can see how the patient was able to restore most of their sight after performing VRT

# Vision Restoration Therapy Patient Testimonial

*"I could not be independent anymore. I could not be myself, not being able to drive took my life away.*

*With VRT my visual field improved to a 90%. I was able to publish a book and run 2 marathons! This would have been impossible without my vision recovery."*



Visit us at <http://www.novavision.com/vrt-patient-testimonials/> for additional patient testimonials 

Here is a testimonial from Carole Urban, She suffered a brain injury as a result of a motorcycle accident causing her vision loss, she felt as if she could no longer be independent anymore.

I remember from speaking with her, she mentioned that she was unfortunately discouraged by her physician and they told her that there was nothing out there for her. But Carole and her sister didn't give up, they searched online and that's when they came across VRT. She performed the therapy for 8 months and her visual field improved to a 90%.

Now she's back to running marathons, playing her guitar and just being independent again.

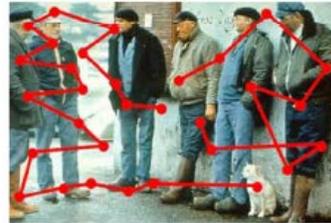
# Recovery Options: Vision Compensation



## NeuroEyeCoach

- Using saccadic training, patients are trained to rapidly and continuously scan their surroundings in order to direct their gaze toward the blind field, bringing the previously unseen objects within their sighted field.
- Designed to have a real positive impact on activities of daily living and is FDA registered.
- Leads to meaningful improvement in visual search performance, resulting in improvements in navigation skills and object finding.
- Increases the efficiency of a patient's eye movement and re-train the patient's ability to make the most of their remaining vision.
- Can be performed either in a center under physician supervision or at home.
- Treatment Duration: as quick as 2-4 weeks.

**before training**  
(small eye shifts, many fixations; longer scanning time)



**after training**  
(larger eye shifts, less fixations, shorter scanning time)



**Dots: fixations, lines: eye shifts**



The next therapy is a compensation therapy called NeuroEyeCoach. Using this type of therapy patients are trained to rapidly and continuously scan their surroundings in order to direct their gaze towards the blind field, bringing the previously unseen object with their sighted field.

So overall it increases the patients eye movement and retrains the patients ability to make the most of their remaining vision.

This therapy is FDA registered and it can also be done at home on a computer. It doesn't require a prescription and the duration of this therapy is 2-4 weeks.

The images on the screen are a great example of the results of neuroeyecoach. If you look at the picture on the left, all those dots represent the many times the person fixated on a specific area, so because of their vision deficit it took approximately 31 fixations to scan the image.

And if you look at the image on the right, after performing NeuroEyeCoach, the patient was able to make larger eye shifts, less fixations and the scanning time was improved as well. The patients outcome led to an improved quality of life especially on activities of daily living.

## NeuroEyeCoach Patient Testimonial

*"I feel more confident and safe with my improved ability to see more while also having a heightened awareness of my surroundings. I can't put a value on what I have gained with NeuroEyeCoach, I can just say Thank You with all that I am."*

Luree - Virginia

Visit us at <http://www.novavision.com/neuroeyecoach-testimonials/> for additional patient testimonials



Here is a testimonial from Luree, after the completion of NeuroEyeCoach she was more confident and aware of her surroundings.

## Recovery Options: **Substitution**

- Through the use of optical aids.
- Goal: Extension of sighted field towards the blind field.
- Coping strategy → This does not increase sensitivity in the blind field but rather uses prisms to optically shift part of the visual space.
- While there may be an initial improvement (typically  $<10^\circ$  (Giorgi et al., 2009), over time, the results often deteriorate. Also, many stroke patients find the use of prisms to be visually confusing and reject this coping technique.



Substitution therapy options are more of a way to cope with the visual deficit, for example some patients may use prism glasses which alerts them to something which would normally not be seen and they can then turn to observe it more closely, thereby avoiding running into people or objects simply from lack of seeing them.

But this does not increase sensitivity in the blind field, and over time the results often deteriorate. Also many stroke patients find the use of prisms to be visually confusing and reject this coping technique.

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## Why Your Doctor Might Be Hesitant

Although therapies based on Neuroplasticity, such as [Vision Restoration Therapy](#), are based on years of research, some doctors may be hesitant to prescribe this therapy.

- Physicians may not be familiar with the clinical data supporting VRT.
- Physicians may have questions relating to the therapy before writing a prescription.

Have an informed discussion with your doctor!



I mentioned earlier from Carole's testimonial how she was discouraged by her physician, she is one of many people that have the same experience.

Some physicians may not be familiar with the clinical data supporting Vision Restoration Therapy, and some may have questions relating to the therapy process before writing a prescription, we are happy to help initiate the discussion between you and your doctor.

## Next Steps:

1. Visit NovaVision's blog and read up about [Neuroplasticity & Post-Stroke Vision Loss](#).
2. Take NovaVision's [online vision test](#) to help identify a possible deficit and facilitate an informed discussion about your vision concerns with your physician.
3. [Visit the NovaVision website](#) to get answers to any questions you might have.
4. Talk to your doctor.
5. Or find a [Prescribing Physician](#) from NovaVision's online physician directory.



If you or any person you know that can benefit from these therapies and would like more information, we have several options, you can download our Ebook which talks further about neuroplasticity and vision loss,

Also, we offer a free online vision test on our website that can help identify any possible vision deficits, the test results are emailed after completion of the test, you can then email them or print them and show them to your physician, this can help facilitate an informed discussion with your physician.

Or you can simply go to [www.novavision.com](http://www.novavision.com) and check out all the resources available, we offer a blog, a resource section with forms and brochures, there is many patient and physician testimonials and videos, we also offer a physician directory in case you don't have a current physician.

# Thank you for your time!



I would like to thank you for your time and letting us bring awareness to anyone with a visual deficit caused by a stroke or other brain injury.

If you have any questions you can reach out to us at 561.558.2000 and speak to our patient services team!

Have a great day!