2021 | @HEARINGASSESSMENTCENTER

DEMENTIA

Official Publication of Hearing Assessment Center

What's Inside This Issue:

Hearing loss is a comorbid disease, meaning it results or relates to many other conditions (please check out our EBook**: Comorbidities of Hearing Loss**). Below, we will be discussing one of the more well-known comorbidities of hearing loss, and that is cognitive impairment. In particular, we will review dementia.

The prevalence of cognitive impairment is much higher in those with hearing loss. Did you know that hearing loss is the most modifiable risk factor of dementia?

Before discussing the link between hearing loss and dementia, let's better understand the difference between mild cognitive impairment and dementia and explain how these conditions may impact one's quality of life.

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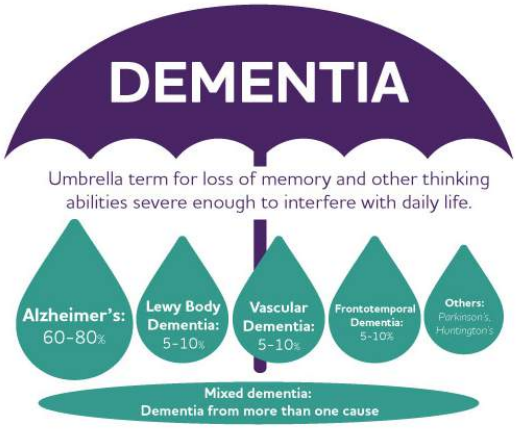
MILD COGNITIVE IMPAIRMENT AND DEMENTIA

Mild cognitive impairment (MCI) causes a slight, but noticeable and measurable, decline in cognitive abilities, including memory and thinking skills without affecting the individual's ability to carry out everyday activities. A person with MCI is at an increased risk of developing Alzheimer's or other forms of dementia.

Dementia is not a single disease, it is an overall term that covers a wide range of specific diseases and conditions characterized by a decline in memory, language, problem-solving, and other thinking skills that affect a person's ability to perform everyday activities.



Disorders falling under the umbrella term "dementia" are caused by abnormal, physical changes within the brain. As a result, this triggers a decline in thinking skills (known as cognitive abilities), impairment of daily life and independent function. Furthermore, behaviors, feelings and relationships may also be affected.

Alzheimer's is the most common cause of dementia. The second most common is vascular dementia, which occurs because of microscopic bleeding and blood vessel blockage in the brain. There are many other conditions that can cause symptoms of dementia, including thyroid problems, vitamin deficiencies, depression, and more recently discovered, **hearing loss**.

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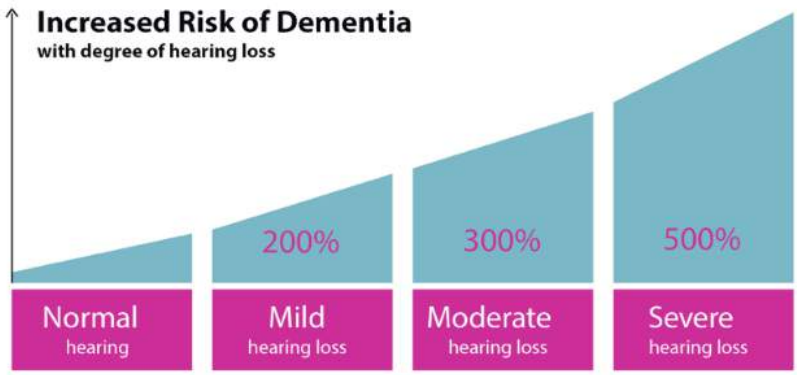
Worldwide, there are ~45 million people who have some form of dementia. In the U.S., 48+ million people suffer from hearing loss. A John's Hopkins scientist, Dr. Frank Lin was the first to substantively document the link between hearing loss and dementia. This research shows that hearing loss can increase the risk of dementia by 200-500%. This is a HUGE fact. In the past, our society was exposed to cigarettes, lead paint and asbestos. Previously, we used these items because we did not understand the danger and consequence. That is, until research showed us the connection between these items and cancer. For too long, hearing loss has been casually thought of and treated. Thanks to recent research, we know that treating your hearing loss (appropriately) might be the single best way to offset your risk of developing dementia. In our clinics, we are starting to objectively document improvements in memory and executive functioning during the early stages of hearing loss treatment.



Dr. Rory Cernik

"I always will tell my patients that we walk with our spine and we hear with our brain. So the term "hearing loss" doesn't quite seem significant enough! We call it like it is, hearing loss is a communication handicap. And since hearing loss can lead to reduced cognitive performance, we feel a better term is ***Cognitive Hearing Loss****."*

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COGNITIVE HEARING LOSS

We routinely see patients with one or more of the following signs of a cognitive hearing loss. If you have ANY of the below symptoms and you do not currently treat your hearing loss, you may be at risk for cognitive decline. We define cognitive hearing loss as:

1. Lack of Clarity

The inability to clearly understand the speaker. You may misinterpret words, for example: if you are at dinner with your wife and she asks “what kind is it?" you may respond with “it is 7:45". Mistaking “time” for “kind".

2. Tinnitus

The occasional or constant ringing, buzzing or chirping in your ear(s) in the absence of any external sound. Tinnitus is often associated with hearing loss.

3. Difficulty in the Presence of Background Noise

The most common complaint among those with hearing loss is the inability to hear in a noisy environment. Any noise, speech or babble that competes with the primary speech signal is considered background noise. Most of us are in this type of setting for the majority of the day.

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Can you believe that most hearing-care practices DO NOT assess their patient's ability to hear in a background noise environment? In fact, less than 15% do so. At this clinic (HAC), we examine each patient's cognitive abilities by running a battery of tests.

Here is Dr. Rory Cernik giving an example:

"An unremarkable brain may be able to filter speech from background noise, even when speech is heard at the same intensity (volume) level as the background noise. In contrast, someone with a diagnosed cognitive hearing loss may require speech to be 15 dB (volume) above the background noise-level, just to hear and understand. Without doing the proper testing and/or gaining this information, we cannot properly help our patients reduce their risk of cognitive decline associated with hearing loss."

One particular test is known as QuickSIN™ speech-in-noise test. Where the patient is asked to repeat a few sentences in the presence of background noise. The test gives us a ratio, which defines, for your brain, how much louder in volume the signal needs to be above the competing background competing noise levels. We believe that hearing loss cannot be properly diagnosed without QuickSIN testing.

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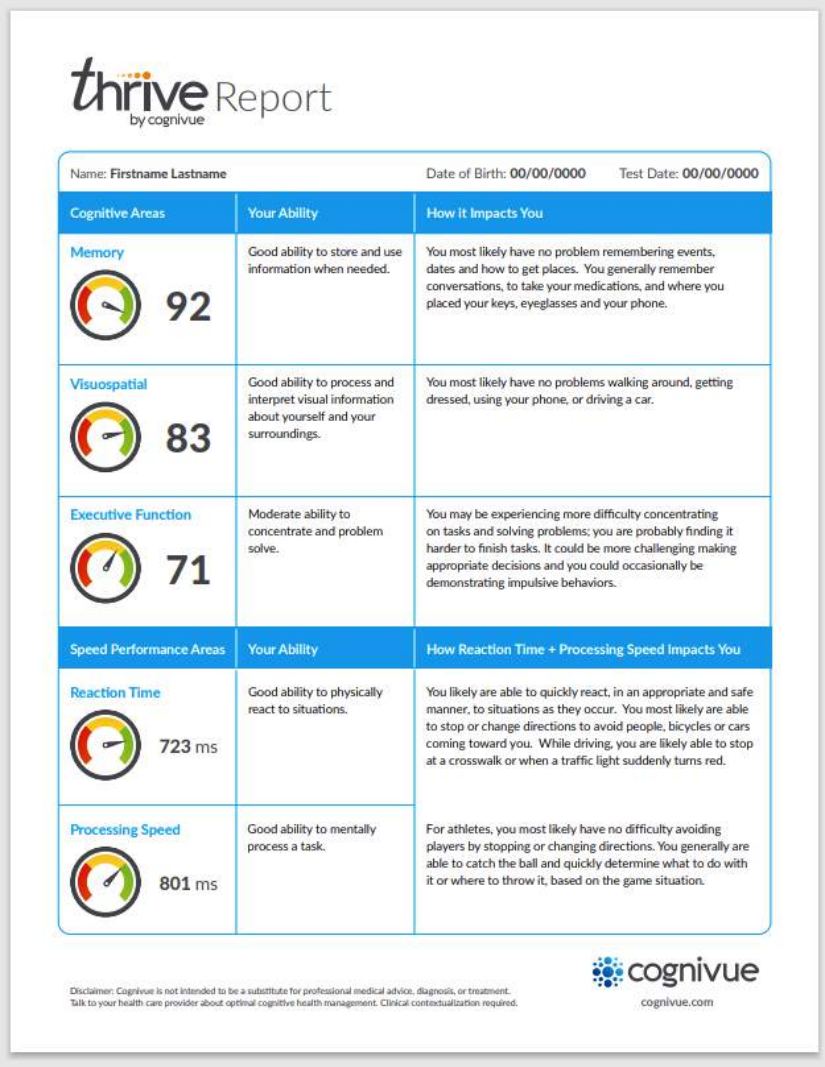
HOW DO WE MEASURE COGNITIVE HEARING LOSS AT THE HEARING ASSESSMENT CENTER?

Cognivue is a computerized screening tool assessing cognitive function and requires no auditory component, meaning hearing loss will not affect results. This screener can be completed in 5 minutes and will provide quick results for three key cognitive domains: memory, visual-spatial abilities and executive function as well as two performance parameters: reaction time and process speed. Screening allows for providers to educate patients about treatment options and improve patient outcomes.



thrive by cognivue Report

Name: **Firstname Lastname** Date of Birth: **00/00/0000** Test Date: **00/00/0000**

Cognitive Areas	Your Ability	How it Impacts You
Memory **92**	Good ability to store and use information when needed.	You most likely have no problem remembering events, dates and how to get places. You generally remember conversations, to take your medications, and where you placed your keys, eyeglasses and your phone.
Visuospatial **83**	Good ability to process and interpret visual information about yourself and your surroundings.	You most likely have no problems walking around, getting dressed, using your phone, or driving a car.
Executive Function **71**	Moderate ability to concentrate and problem solve.	You may be experiencing more difficulty concentrating on tasks and solving problems; you are probably finding it harder to finish tasks. It could be more challenging making appropriate decisions and you could occasionally be demonstrating impulsive behaviors.
Speed Performance Areas	**Your Ability**	**How Reaction Time + Processing Speed Impacts You**
Reaction Time **723** ms	Good ability to physically react to situations.	You likely are able to quickly react, in an appropriate and safe manner, to situations as they occur. You most likely are able to stop or change directions to avoid people, bicycles or cars coming toward you. While driving, you are likely able to stop at a crosswalk or when a traffic light suddenly turns red.
Processing Speed **801** ms	Good ability to mentally process a task.	For athletes, you most likely have no difficulty avoiding players by stopping or changing directions. You generally are able to catch the ball and quickly determine what to do with it or where to throw it, based on the game situation.

Disclaimer: Cognivue is not intended to be a substitute for professional medical advice, diagnosis, or treatment. Talk to your health care provider about optimal cognitive health management. Clinical contextualization required.

cognivue
cognivue.com

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HOW THE TEST WORKS

After completing the five minute evaluation, you will immediately receive your results for **three cognitive domains** and **two performance parameters**:

COGNITIVE DOMAINS

MEMORY

- Ability to store and use information
- Ability to localize sounds and make use of visual cues

EXECUTIVE FUNCTION

- Ability to concentrate and problem solve
- Ability to focus on a single speaker in noise, focus on multiple speakers at once and focus on speech stimuli while ignoring irrelevant distractions

VISIOSPATIAL

- Ability to process and interpret information about yourself and your surroundings
- Ability to process complex sentences, recognize speech in hard situations, understand and remember speech recognition in background noise

SPEED PERFORMANCE AREAS

REACTION TIME

- *What it tests:* Ability to physically react to situations; time it takes place between stimulus and responding to it
- *Relation to hearing health:* ability to respond quickly to questions and comments

PROCESSING SPEED

- *What it tests:* Ability to mentally process a task based on strategy and acquired skills
- *Relation to hearing health:* ability to follow rapid conversation

*See the **Cognivue E-book** for more information on what each test specifically tests and how it relates to your hearing health.*

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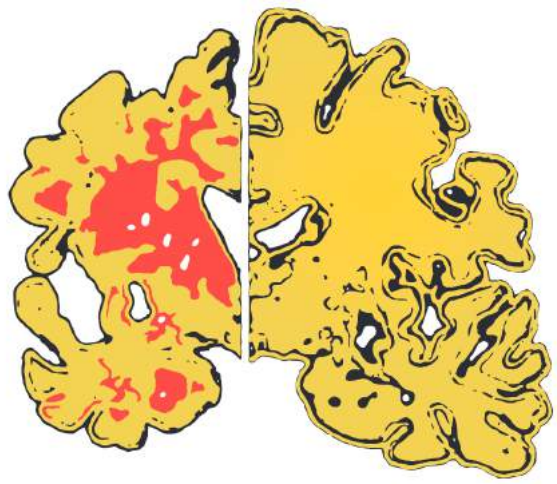
LINK BETWEEN COGNITIVE IMPAIRMENT AND HEARING LOSS

Multiple studies have suggested that people with hearing loss are more likely to have an increased rate of cognitive decline due to:

1. **Cerebral Atrophy (aka Brian Shrinkage):** The concept of your brain shrinking due to a loss of neurons is well documented and has been associated with dementia, as well as Mild Cognitive Impairment. In recent years, MRI scans of the brain have shown that hearing impairment is associated with accelerated brain atrophy in both the overall brain, as well as important parts of the brain that focus on memory, hearing, speech, and language.



Brain With Hearing Loss Brain With Normal Hearing

2. **Social Isolation:** Social isolation occurs from reduced social and physical activity. For those with hearing loss, they often withdraw from social situations due to embarrassment, fear of making mistakes in conversation and feeling disengaged from conversations. It is also common for those with hearing loss to withdraw from physical activity as well. When you combine the social isolation and the diminished physical activity, you increase the risk of developing dementia. This result comes in the form of cognitive understimulation.

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3. **Cognitive Overload:** The loss of hearing is not normal and neither is the excess strain it puts on the brain. With hearing loss, your brain has to work harder to decode and process what is being said. This brain is using resources from other areas within the cortex, which are responsible for working memory, executive function and language, just to hear. This scenario is termed cognitive load.

> Let's assume you drive a manual transmission vehicle. Imagine you are driving 75 mph, on a highway, in 2nd gear. The engine would be operating at 100% capacity and will likely, as a whole, begin to fail. The same holds true with a brain with hearing loss. When you utilize other areas of the brain for hearing, there will be a trade-off or consequence. This trade-off, unfortunately for most, will be a reduction in cognitive performance. The good news is when you properly treat your hearing loss, the risk factor for developing cognitive load will be significantly reduced.

For more information on how our short and long-term memory impacts our hearing abilities, consult our **Cognivue** e-book.

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WHAT IS PUPILLOMETRY?

As previously mentioned, hearing in noise is the biggest problem people with hearing loss face. For a person with hearing loss, your brain is working hard to process what is being said, and it is actually working even harder if you cannot understand all the words. The listening effort required to keep up with the conversations can be exhausting for people with hearing loss.

Recent studies have looked at how hard your brain has to work in order to understand speech in different environments such as around the dinner table via **pupillometry**.

Pupillometry is a well-recognized way to measure pupil dilation. Cognitive tasks such as learning, thinking and hearing activate specific areas within the brain. Greater pupil dilation has been associated with a higher level of processing within the brain. This is what we call cognitive load. Researchers have found that when we pay attention to sound, the muscles in the eyes contract and release based on listening effort. Pupillometry has become a valuable new way to assess strain on the brain's processing power when trying to understand speech.

In one study, pupil dilation was recorded while the participants repeated back sentences in simulated noisy environments. See below how the participants were oriented in the booth. The study compared how different levels of hearing aid technology altered pupil dilation in the participants.

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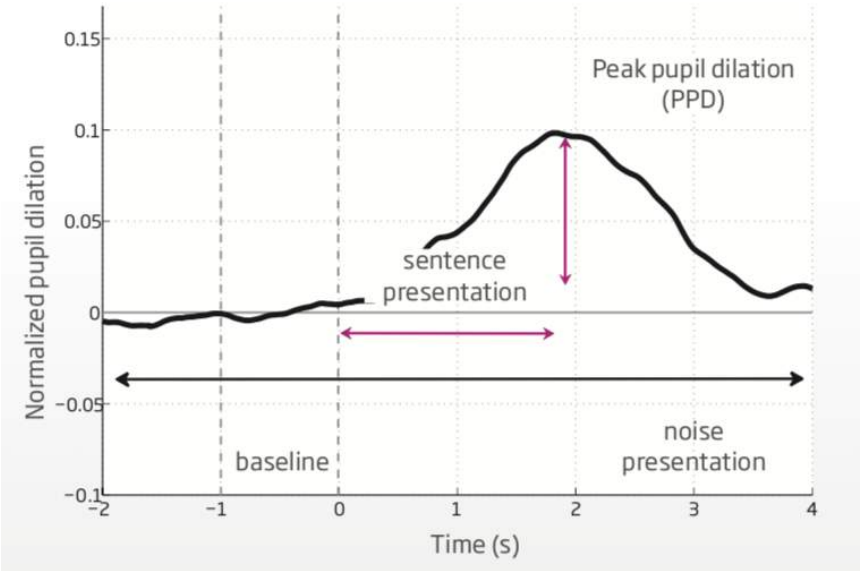
The results showed the new premium technology (which is what we use at HAC), had a 20% reduction of listening effort in the presence of background noise, thus making it easier for the brain to process. Premium technology can reduce pupillary dilation and listening efforts in the presence of background noise; thereby reducing cognitive load.



WHAT HAC DOES TO TREAT YOUR HEARING LOSS

Prior to determining the proper treatment for cognitive hearing loss, you will undergo a battery of tests which will look at individual parts of the auditory system and the system as a whole. We will also perform an in-depth Audio-Cognitive evaluation. Next, your hearing loss will be diagnosed to determine if you are at a high risk for cognitive decline. On average, we spend more than 1 hour with each patient discussing options and answering questions.

When asked about our mission here at HAC, **Dr. Rory Cernik commented**:

"Our ultimate goal in treating hearing loss is to reduce the risk factors of developing dementia and potentially improve cognitive abilities. That is why we use premium technology when treating hearing loss because it gives our patients the best likelihood of reducing their cognitive load, thus reducing the incidence of dementia."

Research has found premium hearing devices can reduce listening efforts and improve cognitive function, particularly the area called working memory after only 3 months of use. As previously mentioned, treating your hearing loss is the single most important thing you can do to reduce your risk of developing a cognitive impairment.

- Have regular hearing evaluations, starting at age 50
- Following the recommended treatment plan you discussed with your hearing care professional.
- Try your best to lead a healthy lifestyle

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