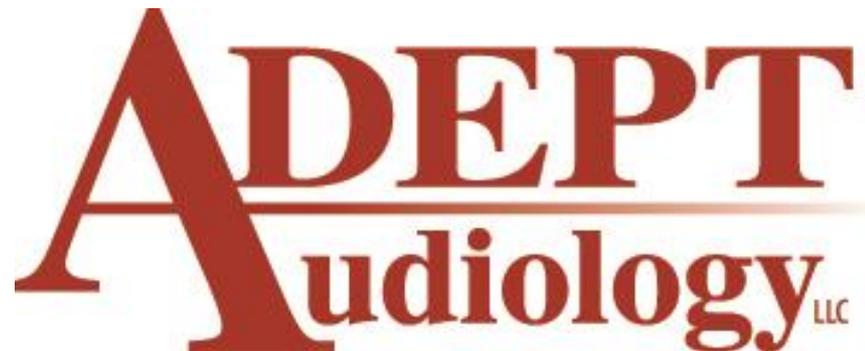


# Untreated Hearing Loss: Effects on Physical, Cognitive, and Social Well Being

Dr. Lyndsey Nalu, Au.D.  
Adept Audiology, LLC

# Background...

- \* Owner of Adept Audiology, LLC
- \* Au.D. from Central Michigan University
- \* Conducted Research
  - \* Audiologic Counseling and Aural Rehabilitation
- \* Licensed by the Florida and Michigan Boards of Audiology
- \* Fellow of the American Academy of Audiology and American Speech-Language and Hearing Association
- \* Board Member of HLAS



# Overview

- \* Statistics on untreated hearing loss
- \* Why is hearing loss often left untreated
- \* Effects of untreated hearing loss
  - \* How our physical, mental, and social well being are at risk
- \* What you can do to avoid putting yourself at risk



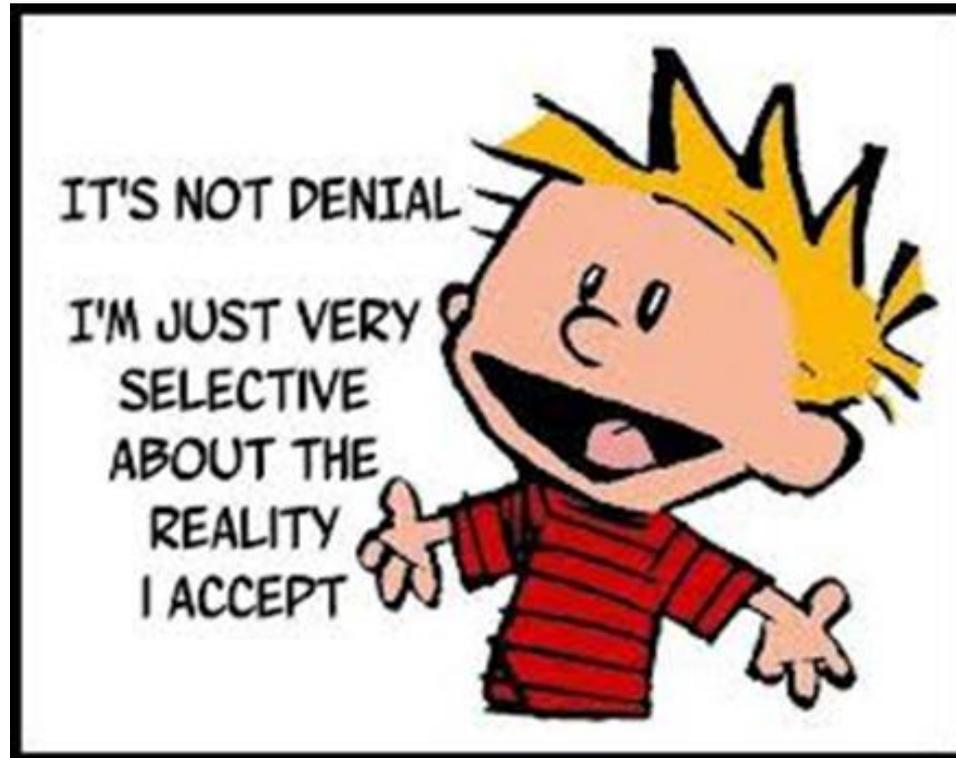
# Who has Hearing Loss?

- \* 48 million Americans have a hearing loss
- \* Approximately 1/3 of Americans between ages 65 and 74 --- nearly half of those over age 75 have hearing loss (NIDCD, 2010)
- \* Hearing loss is the third most prevalent chronic health condition facing older adults

# Who has Untreated Hearing Loss?

- \* Only 20% of those individuals who might benefit from treatment actually seek help
  - \* 38,800,000 untreated
- \* Treatment often delayed until communication is severely affected
- \* On average, hearing aid users wait over 10 years after their initial diagnosis to be fit with their first set of hearing aids

# Why We Wait to Treat HL



# Why We Wait to Treat HL...

- \* Denial!
  - \* Unaware or unwilling to acknowledge loss
  - \* “I hear what I want to hear” “Everyone needs to speak up and stop mumbling”
- \* Stigma
  - \* Makes you look old or is a sign of weakness
- \* Vanity
  - \* Don’t want a big bulky device on or in your ear
- \* Finances
  - \* Costly devices – Medicare and most insurances don’t help

# Why Should I Treat My HL?

- \* Stay connected to the world around you!
  - \* Improve relationships with friends and family
  - \* Environmental sounds are crucial for safety and balance
  - \* Better physical, social, and cognitive well being
  - \* BETTER QUALITY OF LIFE!

# What happens if I Ignore My HL?

- \* Research shows detrimental effects to overall well being
- \* Greater risk to physical, cognitive, and social wellness



# Physical Well Being

- \* Physical Well Being
  - \* Fatigue
    - \* Brain is working overtime trying to put together the message
    - \* Simple conversation relies on brain activity from many areas:
      - \* Speech production
      - \* Speech comprehension
      - \* Hearing
      - \* Sight
  - \* A HOH person has to think, concentrate and work much harder

# Fatigue



- \* Overall feeling of tiredness and exhaustion
- \* Lack of energy throughout the day
- \* Decline in focus and concentration
- \* Less able to monitor own self-care and more prone to depression
- \* Less productive and more prone to accidents



# Balance and Falls

- \* John Hopkins Study
  - \* People with a mild hearing loss are almost **three times more likely to have a history of falling than those with no hearing loss**
    - \* Every additional 10 decibels of hearing loss means an increased 1.4-fold risk of falling
- \* Due to lack of awareness of surroundings
- \* Brain may be overwhelmed by demands from HL and not responding adequately in other areas

# Hospitalization/Illness

- \* Researchers analyzed data from more than 1,100 American men and women aged 70 and older with hearing loss
  - \* Over a four-year period, **HOH individuals were 32% more likely to have been admitted to the hospital** than over 500 adults with normal hearing
- \* 36% more likely to have prolonged stretches of illness or injury
- \* 57% more likely to have extended episodes of stress, depression or bad mood

*(Journal of the American Medical Association, 2013)*

# Stress

- \* HOH report higher levels of stress
- \* Stress can lead to:
  - \* Increased muscle tension
  - \* Headaches
  - \* Increased blood pressure, hypertension
  - \* Increased tinnitus (ringing/noise in the ears)
  - \* Difficulty Sleeping





# Tinnitus

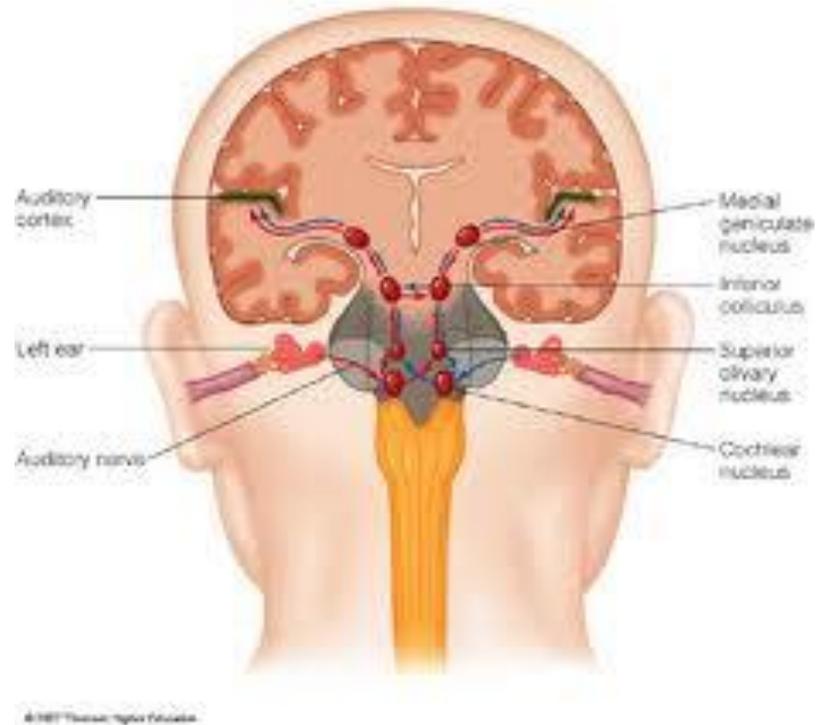
- \* Perception of sound in the ear when no sound is actually present
- \* Often accompanies hearing loss
- \* Hearing loss left untreated can result in tinnitus becoming more bothersome
  - \* Difficulty sleeping
  - \* Interfering with ability to hear and understand others

# Summing up Physical Effects

- \* Fatigue
- \* Balance problems and more likely to fall
- \* Increased risk for hospitalizations and illness
- \* Increased stress, which can lead to a variety of other health problems
- \* Increased tinnitus

# Cognitive Effects

- \* We don't hear with our ear, we hear with our Brain!
- \* Sound is transmitted from ear to brain
- \* All sounds are processed at the level of the brain

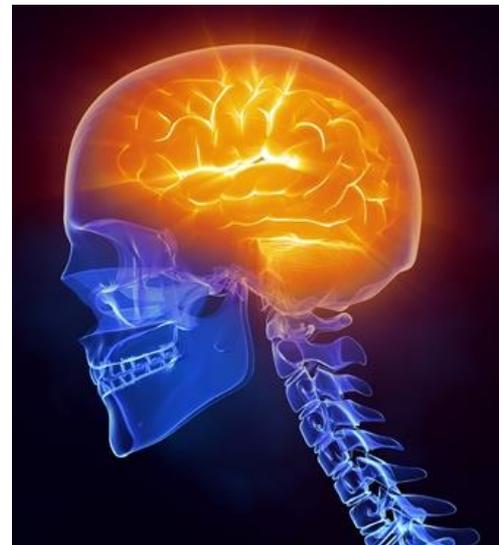


# Hearing Loss and the Brain

- \* Hearing loss causes inadequate stimulation of specific areas in the brain
- \* Lack of stimulation causes structures to atrophy
- \* Ability to process and recognize speech and other sounds is compromised
  - \* Speech can become garbled and muffled
  - \* Brain cannot remember how to distinguish between certain speech sounds
    - \* f/v – b/p—s/t (mixing of consonant sounds)

# Hearing Loss and the Brain

- \* Can we get these areas back?
  - \* The loss of brain structures may be permanent
    - \* Studies show some re-growth after stimulation is introduced (hearing devices)
    - \* Recovery is never complete



# Cognitive Effects

- \* Many studies that link hearing loss to:
  - \* Difficulty processing speech in the presence of noise
  - \* Difficulty processing rapid speech
  - \* Loss of brain tissue
  - \* Cognitive decline
  - \* Dementia

# Speech Processing

- \* Brain naturally filters out background noise
  - \* Focuses on speech (important information)
  - \* Attempts to ignore background noise (unimportant information)
- \* HL causes disruption in filtering
  - \* Brain cannot discriminate between speech and noise
  - \* Difficult to focus in noisy environments

# Speech Processing

- \* Studies show HL causes great difficulty processing rapid speech
- \* Brain processes sounds more slowly
- \* Inability for brain to keep up with speech and incoming auditory information



# Loss Of Brain Tissue

- \* Johns Hopkins – Dr. Lin
- \* The Baltimore Longitudinal Study of Aging
  - \* Started in 1958 by the National Institute on Aging
  - \* Tracked various health factors in thousands of men and women
  - \* 1994 – Started MRIs on 126 participants
  - \* 75 had normal hearing, 51 had some degree of HL

# Loss of Brain Tissue

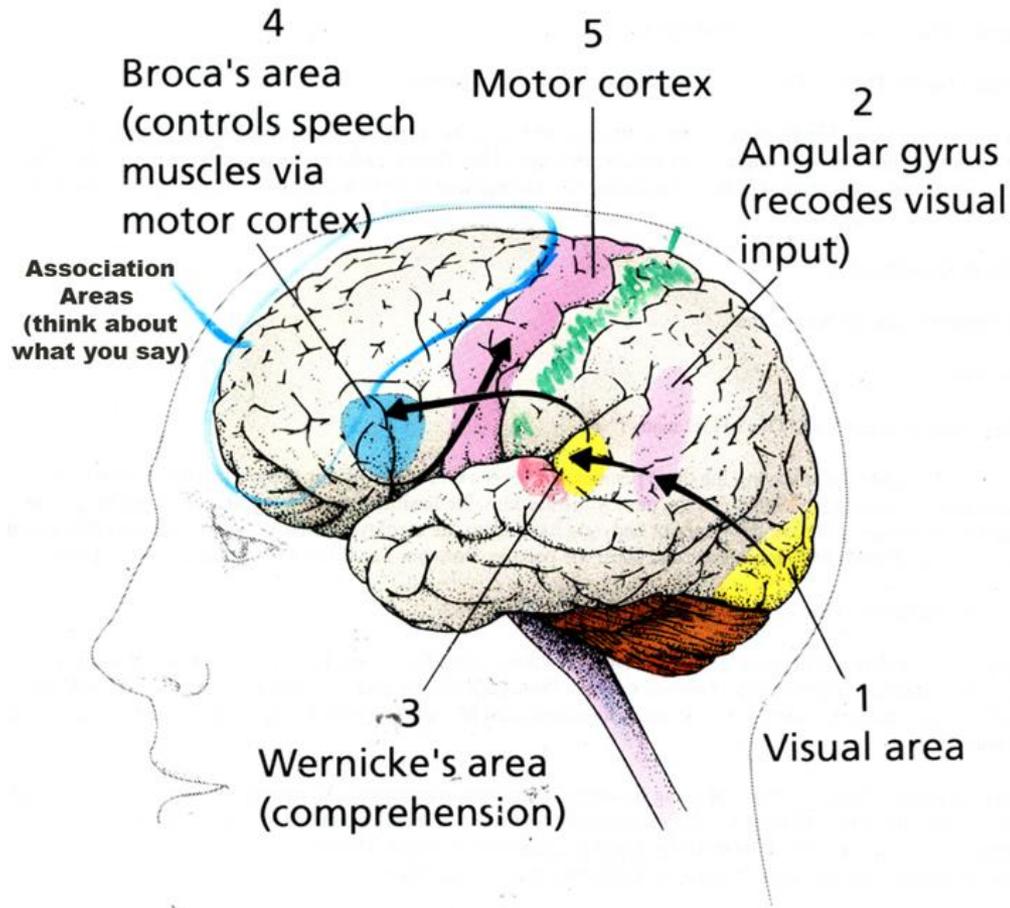
- \* Those with HL had accelerated rates of brain atrophy compared to those with normal hearing
- \* Those with HL lost more than an **additional cubic centimeter of brain tissue each year** compared with those with normal hearing
- \* Significantly more shrinkage in brain structures responsible for processing sound and speech

**Transparency 17**

Figure 2-18, page 46

**Movement of information in the brain from the time a word is read until it is spoken**

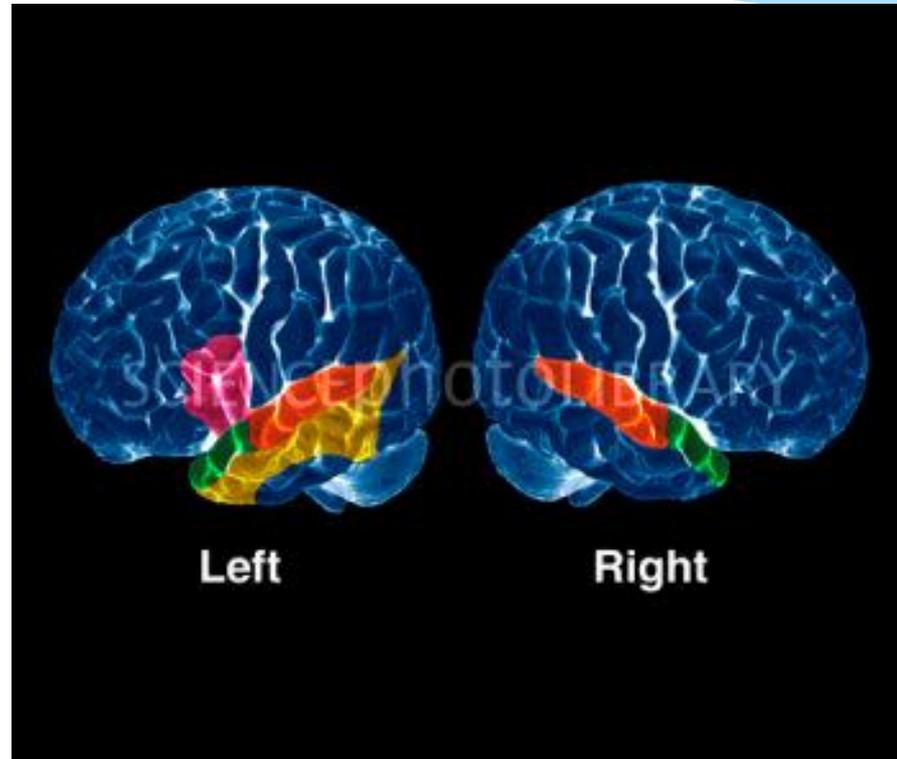
Myers: **Psychology**, Third Edition  
Copyright © 1992 by Worth Publishers, Inc.



# Why the Loss of Brain Tissue?

- \* Regions of the brain are under stimulated
  - \* Not as simple as affecting only one region
- \* Areas that play roles in memory and sensory integration are also affected
  - \* Mild cognitive impairment and Alzheimer's disease
- \* "Our results suggest that hearing loss could be another 'hit' on the brain in many ways," Lin

# Brain Areas Related to Speech and Hearing





# Brain Activity

- \* Perelman School of Medicine at the University of Pennsylvania
- \* Analyzed brain activity when listening to complex sentences
- \* People with hearing loss showed less brain activity on functional MRI scans
- \* Poorer hearers also had less gray matter in the auditory cortex, suggesting that **areas of the brain related to auditory processing may show accelerated atrophy when hearing ability declines**

# Dementia



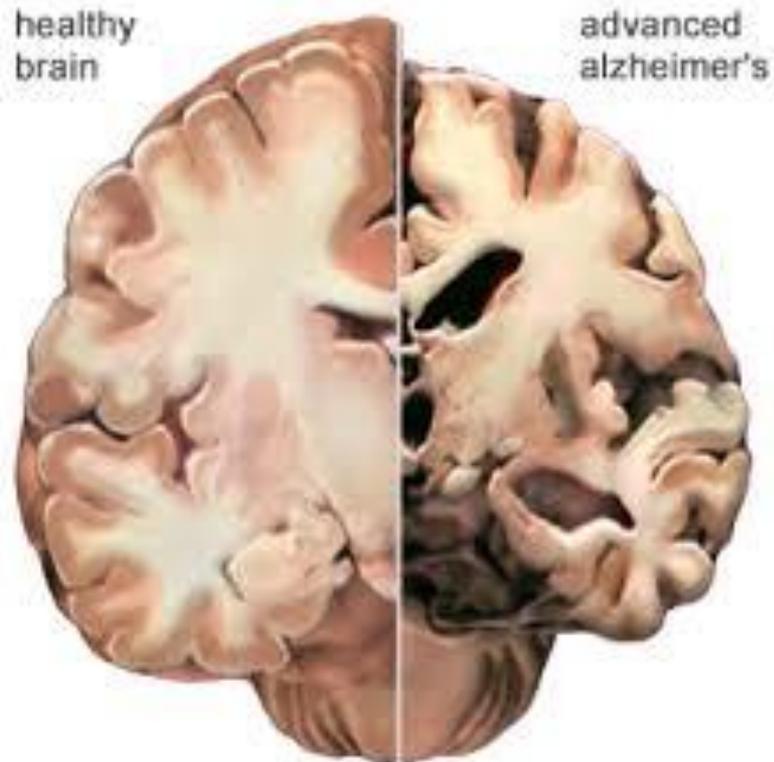
- \* Johns Hopkins Medical Institutions, Dr. Lin and colleagues studied 639 individuals age 36 to 90 without dementia
  - \* 125 had mild hearing loss (25 to 40 decibels)
  - \* 53 had moderate hearing loss (41 to 70 decibels)
  - \* 6 had severe hearing loss (more than 70 decibels)
- \* During a median (midpoint) follow-up of 11.9 years, 58 individuals were diagnosed with dementia, including 37 who had Alzheimer's disease

# Dementia

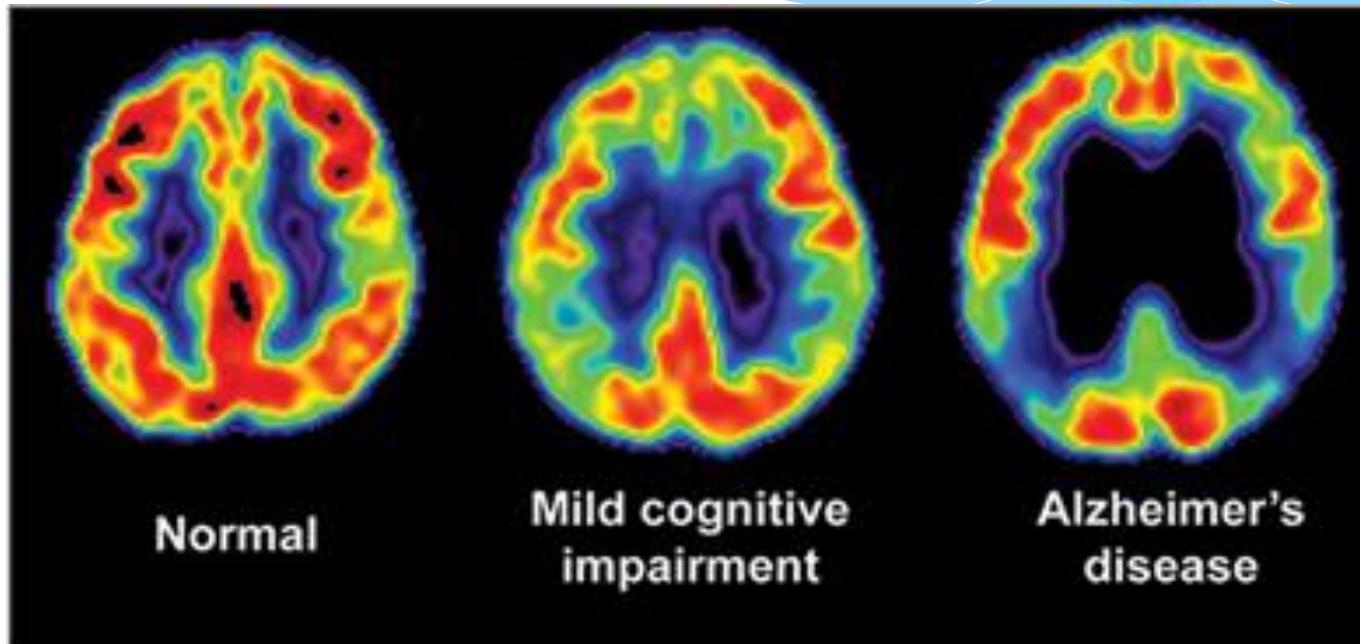


- \* Risk of dementia was increased among those with mild hearing loss
- \* Further increases in risk observed among those with moderate or severe hearing loss as compared with mild hearing loss
  - \* For every 10 decibels of hearing loss, the extra risk increased by 20 percent
- \* For participants age 60 and older, **36% of the risk of dementia was associated with hearing loss**

# Dementia



# Cognitive Impairment/Dementia



FDG-PET images show reduced glucose metabolism in temporal and parietal regions in Alzheimer's disease and mild cognitive impairment.

Courtesy of Drs. Suzanne Baker, William Jagust, and Susan Landau

# Second Study Confirms Findings

- \* 2<sup>nd</sup> Independent study by Dr. Lin
- \* 1984 adults, started in 1997
- \* People who suffer from hearing loss would typically experience a **loss of memory and thinking capabilities approximately 40% faster** than those who have no hearing problems

# What is the Link?

- \* Uncertainty as to why HL increases risk of getting dementia
- \* Theories:
  - \* Cognitive overload--brain tires itself out because it has to overcompensate to hear things
  - \* HL may be an indicator rather than a contributing factor
  - \* Lower Frequency HL may be a "warning sign" for vascular problems, which would cause both hearing loss and dementia
  - \* HL can cause social isolation, which could contribute to the decline of mental faculties

# Summing Up Cognitive Effects

- \* HL can cause brain to process speech sounds inaccurately
  - \* Increased difficulty in noise and with rapid speech
- \* Loss of brain tissue in areas involved in speech and hearing
- \* HL can increase the rate of cognitive decline and dementia in adults

# Social Effects



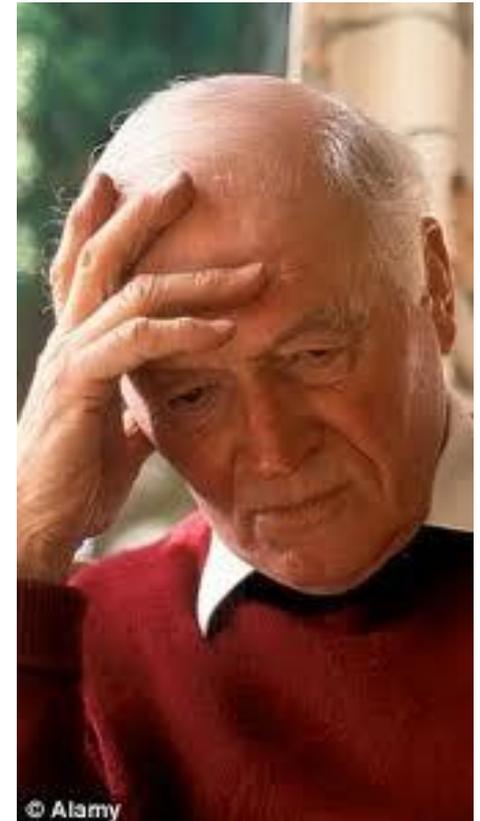
- \* Study by The National Council on the Aging (NCOA)
- \* Survey of 2,300 hearing impaired adults age 50 and older
- \* Those with untreated hearing loss were more likely to report **Depression, Anxiety, and Paranoia**
  - \* Less likely to participate in organized social activities, compared to those who wear hearing aids
- \* “This study debunks the myth that untreated hearing loss in older persons is a harmless condition.”

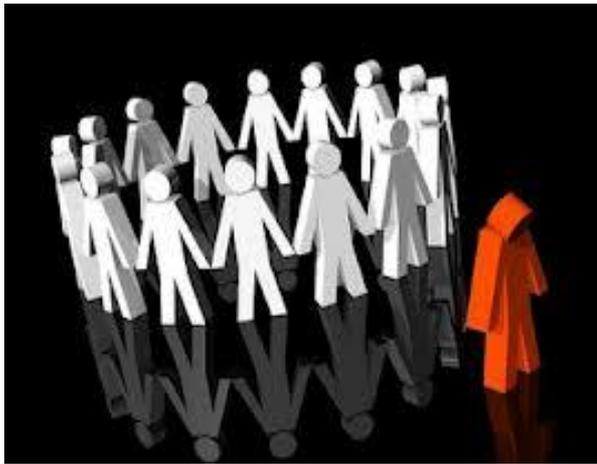
# Sadness/Depression

- \* More of the seniors with untreated hearing loss reported feelings of sadness or depression that lasted two or more weeks during the previous years (<http://www.audiology.org>)
- \* 30% of respondents with more severe hearing loss and non-users of hearing aids reported these sad feelings
  - \* As compared to 22% of hearing aid users

# Depression

- \* Research indicates that as health problems increase, the risk of depression increases
- \* Hearing loss causes significant impact on communication and creates a sense of loss
- \* Negative feelings about self -- associated with hearing loss
  - \* Fear, anger, guilt, incompetence, self loathing, unworthiness (socialworktoday.com, 2010)





# Social Isolation

- \* Hearing loss can create a psychological solitary confinement
- \* Feeling inadequate, stupid, awkward, embarrassed, different, or abnormal
- \* Leads to lack of desire to socialize
  - \* Family relationships – spouse, children, grandchildren
  - \* Friends
  - \* Colleagues/work environments
- \* 42% of hearing aid users participate regularly in social activities
- \* 32% percent of non-users

# Paranoia

- \* Individuals not treating their HL are more likely to experience paranoia
- \* “Other people get angry at me” (classification in the study by NCOA)
- \* 36% with untreated HL (no hearing devices)
- \* 14% with treated HL (using hearing devices)

# Strain on Relationship/Marriage



- \* Research study by HearingDirect.com
  - \* Polled 1000 respondents with HL
  - \* Hearing loss can lead to more arguments between couples, and cause a breakdown of marriages
  - \* HOH feel upset that spouse cannot empathize on how condition affects daily life
  - \* Become isolated from family, friends, and colleagues
- \* 1/3 said their inability to hear properly caused major arguments within the family
- \* 1/16 revealed that their partner had threatened to leave or divorce them unless they sought help

# Decreased Earning Potential

- \* Better Hearing Institute conducted a study on The Impact of Untreated HL on Household Income
  - \* Directly affects income potential
  - \* **HL negatively impacts household income on average up to \$12,000**
  - \* Use of hearing devices mitigates the effects by 50%
- \* Losses in compensation are due to:
  - \* Underemployment
  - \* Mistakes on the job
  - \* Reduced quality of life which affects job performance



# Loss of Independence

- \* Inability to hear speech and environmental sounds may leave you relying on others to help you through life
  - \* Driving – Is it safe for those with impaired hearing?
    - \* Ability to hear your blinker, horns and sirens of police and rescue vehicles, other cars on the road
  - \* Living alone – Is it safe for HOH?
    - \* Family members often concerned
    - \* Ability to hear doorbell, alarms/signals in the house, telephone ring

# Summing up Social Effects

- \* Sadness/Depression
- \* Social Isolation
- \* Paranoia – worrying about what others are thinking
- \* Strain on relationships and marriage
- \* Decreased earning potential
- \* Loss of Independence

# What You Can Do to Avoid Risk!

- \* Preserve Hearing!
  - \* 90% of the time, HL is permanent
  - \* Cannot restore hearing once it is gone
- \* Protect Hearing
  - \* Avoid loud sounds (noisy hobbies, loud music/concerts, gunfire, etc.)
  - \* Wear hearing protection
    - \* Firearms, noisy work environments/hobbies
  - \* Keep music at safe levels
    - \* Tinnitus or TTS is a sign of permanent damage

# Be Proactive!



- \* Annual hearing evaluations
  - \* Insurances will pay for testing
  - \* Baseline testing helps determine rate of decline
- \* Be open with friends and family
  - \* 90% of time, friends/family notice HL before patient
  - \* Provide emotional support
  - \* Come from a place of compassion, not frustration – more effective in overall process

# Seek Treatment!

- \* Do not delay treatment
  - \* Hearing devices stimulate the brain
  - \* May preserve hearing
- \* Use it or lose it!
  - \* Avoiding treatment causes parts of the ear and brain to deteriorate at more rapid rate
  - \* HL is more difficult to treat as it becomes worse
  - \* Speech becomes garbled/muffled and hearing devices cannot restore clarity
- \* Hearing aids improve overall quality of life
  - \* Based on many studies and user reports



# Hearing Devices for Brain Preservation

- \* "As hearing ability declines with age, interventions such as **hearing aids should be considered not only to improve hearing but to preserve the brain,**"
  - \* Dr. Jonathan Peelle, PhD, Department of Neurology.
- \* "Your hearing ability directly affects how the brain processes sounds, including speech."
- \* "Preserving your hearing doesn't only protect your ears, but also helps your brain perform at its best."

# Benefits of Treatment

(per NCOA study)

Improvement Area	Improvement by HA User (%)	Improvement by HA User's Family (%)
Relations at home	56	66
Feelings about self	50	60
Life overall	48	62
Relations with kids and grandkids	40	52
Mental Health	36	39
Self Confidence	39	46
Sense of safety	34	37
Social life	34	41
Relations at work	26	43
Sex life	8	N/A

# Auditory Training

- \* Develop skills and strategies to help you listen and communicate
- \* Retrain brain on speech comprehension
  - \* Improvements up to 40%
- \* Challenging Listening Environments
  - \* Noisy Restaurants
  - \* Rapid Speakers
  - \* Competing Speakers

# Auditory Training Programs

- \* **LACE – Listening and Communication Enhancement**
- \* At home training on computer
- \* Twenty 20-30 minute listening exercises of progressing difficulty
- \* Completed in ten days, or longer if you wish
- \* Purchase from Audiologist
  - \* \$100-\$150

# Auditory Training Programs

- \* **Read My Quips**
- \* Listen to the wise or witty saying—the “quip”—and enter what you think you heard
- \* Noise levels increase
- \* Improve speech comprehension

# Stay Connected



- \* Groups that can offer guidance and information about HL and the process
  - \* HLAA – Sarasota Chapter
    - \* Advocacy, Education, and Support
      - \* Monthly meetings, 2<sup>nd</sup> Wednesday at 1:30pm, N. Sarasota Library
      - \* Expert Speakers
      - \* Peer Mentors
  - \* HLAS After Hours
    - \* Every odd month, Last Tuesday at 6pm, Center for Arts and Humanities

# In Conclusion...

- \* Untreated HL can negatively impact your physical, cognitive and social well being
- \* In order to preserve brain function and improve overall quality of life, it is imperative that individuals seek treatment for their HL

# Thank You

Thank you all for attending this seminar!



# Questions?

