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## What is PPA?

Primary progressive aphasia (PPA) is a form of cognitive impairment that involves a progressive loss of language function. Language is a uniquely human faculty that allows us to communicate with each other through the use of words. Our language functions include speaking, understanding what others are saying, repeating things we have heard, naming common objects, reading and writing. "Aphasia" is a general term used to refer to deficits in language functions. PPA is caused by degeneration in the parts of the brain that are responsible for speech and language. PPA begins very gradually and initially is experienced as difficulty thinking of common words while speaking or writing. PPA progressively worsens to the point where verbal communication by any means is very difficult. The ability to understand what others are saying or what is being read also declines. In the early stages, memory, reasoning and visual perception are not affected by the disease and so individuals with PPA are able to function normally in many routine daily living activities despite the aphasia. However, as the illness progresses, other mental abilities also decline.

Adults of any age can develop PPA, but it is more common in people under the age of 65. People with PPA can have a variety of different language symptoms and no two cases are exactly the same.

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## Symptoms, Causes & Progression

### SYMPTOMS

People with PPA can experience many different types of language symptoms. In many instances, the person with PPA may be the first to note that something is wrong and the complaints may initially be attributed to stress or anxiety. People with PPA initially experience one or more of the following symptoms:

- Slowed or halting speech
- Decreased use of language
- Word-finding hesitations
- Sentences with abnormal word order in speech or e-mails
- Substitution of words (e.g., "table" instead of "chair")
- Using words that are mispronounced or incomprehensible (e.g., "track" for "truck")
- Talking around a word (e.g., "We went to the place where you can get bread" for the words "grocery store")
- Difficulty understanding or following conversation despite normal hearing
- Sudden lapse in understanding simple words

- Forgetting the names of familiar objects
- Inability to think of names of people, even though the person is recognized
- Problems writing (e.g. difficulty writing checks or notes)
- Problems reading (e.g. difficulty following written directions or reading signs)
- New impairments in spelling
- Problems in arithmetic and calculations (e.g. making change, leaving a tip)

People with PPA tend to have similar clusters of symptoms. Researchers who specialize in PPA currently recognize three subtypes: agrammatic, logopenic and semantic.

### **>>>PPA-G (Agrammatic/Nonfluent Subtype): A problem with *word-order* and *word-production***

Speech is effortful and reduced in quantity. Sentences become gradually shorter and word-finding hesitations become more frequent, occasionally giving the impression of stammering or stuttering. Pronouns, conjunctions and articles are lost first. Word order may be abnormal, especially in writing or e-mails. Words may be mispronounced or used in the reverse sense (e.g., “he” for “she” or “yes” for “no”). Word understanding is preserved but sentence comprehension may suffer if the sentences are long and grammatically complex.

### **>>>PPA-L (Logopenic Subtype): A problem with *word-finding***

In contrast to PPA-G, speech is fluent during casual small talk but breaks into mispronunciations and word-finding pauses when a more difficult or precise word needs to be used. Some people with PPA-L are very good at going around the word they cannot find. They learn to use a less apt or simpler word as well as to insert fillers such as “the thing that you use for it,” “you know what I mean,” or “whatchamacallit”. Spelling errors are common. The naming of objects becomes impaired. Understanding long and complex sentences can become challenging but the comprehension of single words is preserved.

### **>>>PPA-S (Semantic Subtype): A problem with *word-understanding***

The principal feature is a loss of word meaning, even of common words. When asked to bring an orange, for example, the person may appear puzzled and may ask what an “orange” means. Speech has very few nouns and is therefore somewhat empty of meaning. However, it sounds perfectly fluent because of the liberal use of fillers. The person may seem to have forgotten the names of familiar objects.

## **Causes**

PPA arises when nerve cells in language-related parts of the brain malfunction. The underlying diseases are called “degenerative” because they cause gradually progressive nerve cell death that cannot be attributed to other causes such as head trauma, infection, stroke or cancer. There are several types of neurodegeneration that can cause PPA. The two most commonly encountered types are frontotemporal lobar degeneration (FTLD) and Alzheimer’s disease (AD).

Both FTLD and AD can lead to many different patterns of clinical impairments, depending on the region of the brain that bears the brunt of the nerve cell loss. When AD or FTLD attacks the language areas (usually

on the left side of the brain), PPA results. PPA is caused by AD in approximately 30-40% of cases and by FTLD in approximately 60-70% of cases. In contrast, PPA is a very rare manifestation of AD. In the vast majority of patients with AD, the most prominent clinical symptom is a memory loss for recent events (amnesia) rather than an impairment of language (aphasia). PPA is therefore said to be an “atypical” consequence of AD. The logopenic type of PPA has a particularly high probability of being caused by AD. Specialized positron emission tomography (PET) scans and examination of the spinal fluid may help to resolve the distinction between the two underlying diseases. Whether or not PPA is caused by AD or FTLD can be determined definitively only at autopsy through examination of brain tissue with a microscope.

This can be confusing because for reasons outlined in the previous paragraph, the word “Alzheimer’s” can be used in two different ways. The term Alzheimer’s dementia (or Dementia of the Alzheimer-Type) is used to designate a progressive loss of memory leading to a more generalized loss of all cognitive functions. The term Alzheimer’s disease (as opposed to Alzheimer’s dementia) is used in a different way to designate a precise pattern of microscopic abnormalities in the brain. Sometimes these abnormalities become concentrated in language areas (instead of memory areas) of the brain and become the cause of PPA. So, while PPA patients don’t have Alzheimer’s dementia, 30-40% may have an atypical form of Alzheimer’s disease. This dual use of the word “Alzheimer’s” is confusing, even for the specialist, but is a feature of medical nomenclature that is here to stay.

In the vast majority of individuals, PPA is not genetic. However, in a small number of families, PPA can be caused by hereditary forms of FTLD. The most common gene implicated in these families is the progranulin gene (GRN). Other, less common genes implicated in FTLD include the microtubule associated protein tau (MAPT) and a newly discovered gene, chromosome 9 open reading frame 72 (C9ORF72).

Even in families with genetic mutations, one family member may have PPA while others may have behavioral variant frontotemporal degeneration (bvFTD) or movement disorders, including corticobasal degeneration (CBD) or progressive supranuclear palsy (PSP). In the presence of a genetic mutation, up to 50% of all family members will have FTLD. Therefore, genetic testing is not usually recommended unless several family members have clinical patterns characteristic of PPA, bvFTD, CBD or PSP. Before proceeding with genetic testing, it’s necessary to meet with a genetic counselor to review the implications of the results. The immediate purpose of genetic testing is to determine whether the person has a mutation that is responsible for the disease. However, the results have profound implications for family members who are healthy, especially those of child-bearing age. Do family members want to know the presence of a genetic disease for which there is no treatment? Do they realize that a negative result does not rule out the presence of a mutation in another gene not covered by the testing? Genetic testing for clinical purposes is a serious step that should not be initiated lightly.

## Progression

Because PPA is progressive, decline in language ability continues. Additionally, some non-language abilities (memory, attention, judgment or changes in behavior and personality) can be affected. Disinhibited, inappropriate behaviors (also seen in behavioral variant frontotemporal degeneration) are more common with PPA-S while impairments in problem solving, multi-tasking movement and mobility (of the type seen in CBD and PSP) are more common in PPA-G. The rate of decline is variable from person to person and unfolds over many years. It is unclear why some people progress more rapidly than others.

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# Diagnosis & Treatment

## DIAGNOSIS

A thorough evaluation of PPA includes the following:

- **History:** First, a careful history is taken to establish that a condition of dementia exists. This often requires that family members or friends be questioned about the patient's behavior because sometimes the patient is unaware of the symptoms (as in the case of memory loss or personality changes) or may be unable to describe them due to aphasia.
- **Neurological Examination:** A neurological examination is done to determine if there are signs of dementia on a simple screening of mental functions (the mental status examination) and also if there are signs of motor or sensory symptoms that indicate other types of neurological disorders might be causing the dementia. The neurologist will also order tests (e.g., blood tests, spinal tap, brain imaging studies) to further investigate the cause of the symptoms.
- **Neuropsychological Examination:** A neuropsychological examination provides a more detailed evaluation of mental functioning. This is especially important in the very early stages of illness when a routine screening evaluation may not detect the problems the patient is experiencing. This requires several hours and consists of paper-and-pencil or computer-administered tests of mental abilities, including attention and concentration, language, learning and memory, visual perception, reasoning and mood. The results can indicate if there are abnormalities of thinking and behavior and also their degree--mild, moderate or severe. It is often difficult to demonstrate that individuals with PPA have intact memory since we usually test memory by telling a person some information and then asking them to repeat it later on. In an individual with PPA, it may be impossible to repeat back the information because of the aphasia. Therefore, it is important that testing is done properly to make sure that there is not a true loss of memory.
- **Speech and Language Evaluation:** Since a decline in language abilities is the primary symptom of PPA, it is important to determine which components of language use are most affected, how severely affected they are, and what can be done to improve communication. A Speech-Language Pathologist evaluates different aspects of language in detail and can make recommendations for strategies to improve communication. Family members should be included in the treatment sessions to educate them about how to facilitate communication.
- **Psychosocial Evaluation:** PPA affects not only the individual who is suffering from this disorder, but also all people who are close to the patient. The disorder has an impact on relationships, the ability to continue working, the ability to perform many routine duties, and the ability to communicate even the simplest of needs. Although there are many resources available for individuals with memory loss, there are relatively fewer appropriate resources for individuals with PPA, their relatives and friends. Evaluation with a social worker who is familiar with PPA can address these issues and provide suggestions for dealing with day-to-day frustrations and problems.
- **Brain Imaging Studies:** The evaluation for dementia also includes a brain imaging study. This is done in the form of a computed axial tomography scan (CAT scan) or a magnetic resonance imaging scan (MRI scan). Both of these methods provide a picture of the brain so that any structural abnormalities, such as a stroke, tumor or hydrocephalus--all of which can give rise to dementia-like symptoms, can be detected. In the case of degenerative brain disease, the CAT scan and MRI scan may show "atrophy," which suggests a "shrinkage" of the brain tissue. However, especially in early stages, they

may not show anything. In fact, the report often comes back “normal.” But this only means that there is no evidence for a tumor or stroke. It cannot tell us anything about the microscopic degenerative changes that have occurred.

- **Psychiatric Evaluation:** Sometimes there will also be a need for a psychiatric evaluation. This may be the case when it is not clear if the changes in behavior are due to depression or another psychiatric disturbance. Also, some individuals, especially those with PPA, may become saddened by their condition and may require treatment for depression.

There are many thousands of people with PPA. Nonetheless, compared to the millions of patients with Alzheimer-type amnesic dementias, PPA is rare. Furthermore, it can start in a person’s 40s and 50s, an age range that physicians do not usually associate with neurodegenerative diseases. Therefore, some people with PPA often see multiple doctors and receive many different diagnoses before receiving the diagnosis of PPA.

## TREATMENT

There are no pills yet for PPA. Because of the 30%-40% probability of Alzheimer’s disease (AD), some physicians will prescribe AD drugs such as Exelon (rivastigmine), Razadyne (galantamine), Aricept (donepezil) or Namenda (memantine). None have been shown to improve PPA. Medicine is also sometimes prescribed to manage behavioral symptoms such as depression, anxiety, or agitation, which may occur later in the course of the illness.

There are, however, life-enriching interventions and speech therapies that can help improve a diagnosed person’s quality of life. The primary goal of treatment for language impairments in individuals with PPA is to improve the ability to communicate. Because the type of language problems experienced by patients with PPA may vary, the focus of treatment for improving communication ability will also vary. A complete speech and language evaluation provides the information needed to determine the type of treatment that is most appropriate.

There are two basic approaches to speech therapy for PPA. One approach is to focus treatment directly on the language skills that are impaired (for example, skills to enhance word-retrieval abilities), and the other is to provide augmentative/alternative communication strategies or devices. We recommend that both treatment approaches be used in people with PPA. Regardless of which strategies are provided to people with PPA, it is important that the family is involved in treatment and that the use of the strategy in the natural environment is encouraged.

## Suggestion for Effective Communications for Supportive Communication Partners

### General

- Try not to interrupt and supply a word unless help is requested. Develop a cue that implies help is needed.
- Don't always correct or point out mistakes
- Ask for clarification or repetition, do not pretend to understand when you don't.
- Simplify speech. Ask questions with two choices instead of open-ended questions (e.g. "Do you want eggs or cereal?" instead of "What do you want for breakfast?").
- Have realistic expectations of the person's communication strengths and areas of difficulty.

### Listening

- Listen for key pieces of information (who, what, where, when, why, how)
- Be aware of distracting background noise and reduce it if possible (e.g. turn off TV, move to a quiet room)

### Speaking

- Cue the speaker to talk around the word by encouraging them to tell you about its
  - Purpose or function
  - General category (e.g. fruit, clothing, sport)
  - Physical description (e.g., large, blue, square)
  - Location
  - Synonym
  - Antonym for the word
- Speak slowly and quietly
- Speak to the person as an adult; don't talk down

### Writing

- Can be used when reading and writing are relatively well-preserved
- If the person with PPA has difficulty pronouncing words, write out the word first and then say it out loud
- Write out choices for the person with PPA and let them choose the appropriate response
- Write out conversational scripts to use during specific situations (e.g. ordering a favorite drink at a coffee shop)

### Gestures

- Gestures can be developed for core daily functions
- Practice and have gestures in place, before they are actually needed

### Body Language

- So much of communication is non-verbal!
- Use facial expression and the sense of touch when communication with someone with PPA
- Give a firm handshake, a pat on the back, hold hands, hug, sit close

Communication is a two-way street. Both diagnosed persons and their communication partners will need to adapt to new methods of communication. Working with a speech-language pathologist can help make this transition. Remember, the goal is communication, not perfection.

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# Family & Friends

## Caring for Someone with PPA: Reaching Out and Getting the Help You Need

While Alzheimer's disease strikes a majority of people in their later years, primarily age 65 and over, this fact tends to overshadow those who become affected by dementia at an earlier age. As you learned in an earlier section of this booklet, Primary Progressive Aphasia (PPA) typically strikes people in their 50's and 60's. The early age of onset presents patients and families with unique issues and stresses.

Due to the rarity of PPA, you may have had difficulty obtaining an accurate diagnosis. Once that diagnosis is obtained, there is the task of finding as much information as possible about PPA. At present, there are few resources available. Much of the material provided to caregivers, families and friends of patients is directed toward an older population. Additionally, the programs and services have been geared to meet the needs of that population.

### How will PPA affect my friend or family member's job?

Employment is often the first issue that must be addressed with someone who has been diagnosed with PPA. A professional person in their 50's and 60's is typically at the peak of their career or just approaching retirement, perhaps not ready financially or prepared emotionally to stop working. They may not have finished building their "nest egg" for retirement and may have expenses—such as their children's education—which rely on those additional years of employment.

- Since language and verbal skills are essential for most jobs, the need to terminate employment is inevitable and planning for that is necessary.
- Immediate application for social security disability should be completed, although navigating one's way through this bureaucratic system can be daunting. The Alzheimer's Association has a Disability Documentation Kit which may make your passage a little easier. They can be reached at 1-800-272-3900. If the application for social security is denied, work with your physician to clearly document the diagnosis and advocate on your behalf by appealing the decision. After receiving social security disability benefits for two years, persons under 65 years of age are eligible for Medicare.

### What happens after my family member or friend with PPA is no longer employed?

One of the most common difficulties that arises following termination of employment is finding something valuable to do with the time once spent working. The well spouse may need to continue or return to working outside the home, perhaps seek employment for the first time. The person diagnosed with PPA is experiencing a tumultuous role change from that of an independent, self-sufficient person to that of someone who is becoming increasingly dependent on others. Adult day services programs which have proliferated in number and may provide dementia specific care, tend to focus their efforts on older adults with memory loss. Often, a PPA patient and family feel uncomfortable with this type of a setting. However, persons with PPA have much to contribute and with proper guidance and supervision can remain active in a variety of areas. This takes creativity and perseverance on the part of families. Contacting your local Department of Rehabilitation Services/Department of Human Services is the first step. Call 1-800-275-3677 for the office nearest you.

## What about the family?

There are also unique family issues due to the younger age at which PPA typically occurs. Developmentally, PPA occurs at an age where a chronic illness of this magnitude is unexpected. The well spouse may have the stress of being pulled between work and family, may also be at the peak of their career and/or have young or adolescent children requiring their attention and care. Additionally, these children are experiencing the loss of their parent as they once knew him or her and will need ongoing emotional support and attention as they grieve this loss. Watch for signs of extreme behaviors: withdrawal, apathy, poor school performance, or increased aggression. It may be helpful to seek a counselor experienced in family therapy to give children a safe place to express their feelings and help the well spouse in their new role of single parent. Recognize, too, that the loss of one's relationship with a spouse to this disease over a gradual period of time can raise many different emotions: confusion, anger, guilt, and sadness, to name a few. The role of partner becomes that of caregiver. It is important to remain in touch with the emotions that can arise and seek counseling for support and assistance in coping as needed.

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## PPA Research Program

### About the Study

Primary progressive aphasia (PPA) is a diagnosis made in people who show a gradual impairment of word finding and word usage. The Cognitive Neurology and Alzheimer's Disease Center is a major referral center for PPA and conducts unique clinical, research, and psychosocial programs focusing on this condition.

The National Institute on Deafness and Other Communication Disorders has awarded the CNADC a five-year grant to support one of the most comprehensive PPA investigations ever undertaken. Because many individuals with PPA come from out of town, the grant provides funding for reimbursing participants and a companion for travel to Chicago and for three days' lodging and meals.

The study lasts three days total, about seven hours each day including breaks and lunch. The first two days take place in Chicago and involve neuropsychological testing, magnetic resonance imaging (MRI) scans and an event-related potentials (ERP) task. The final day takes place at Northwestern's main campus in Evanston, IL, located about 15 minutes north of Chicago. There, individuals with PPA participate in a variety of language and naming experiments, some that involve voice recording and others that include ERP testing.

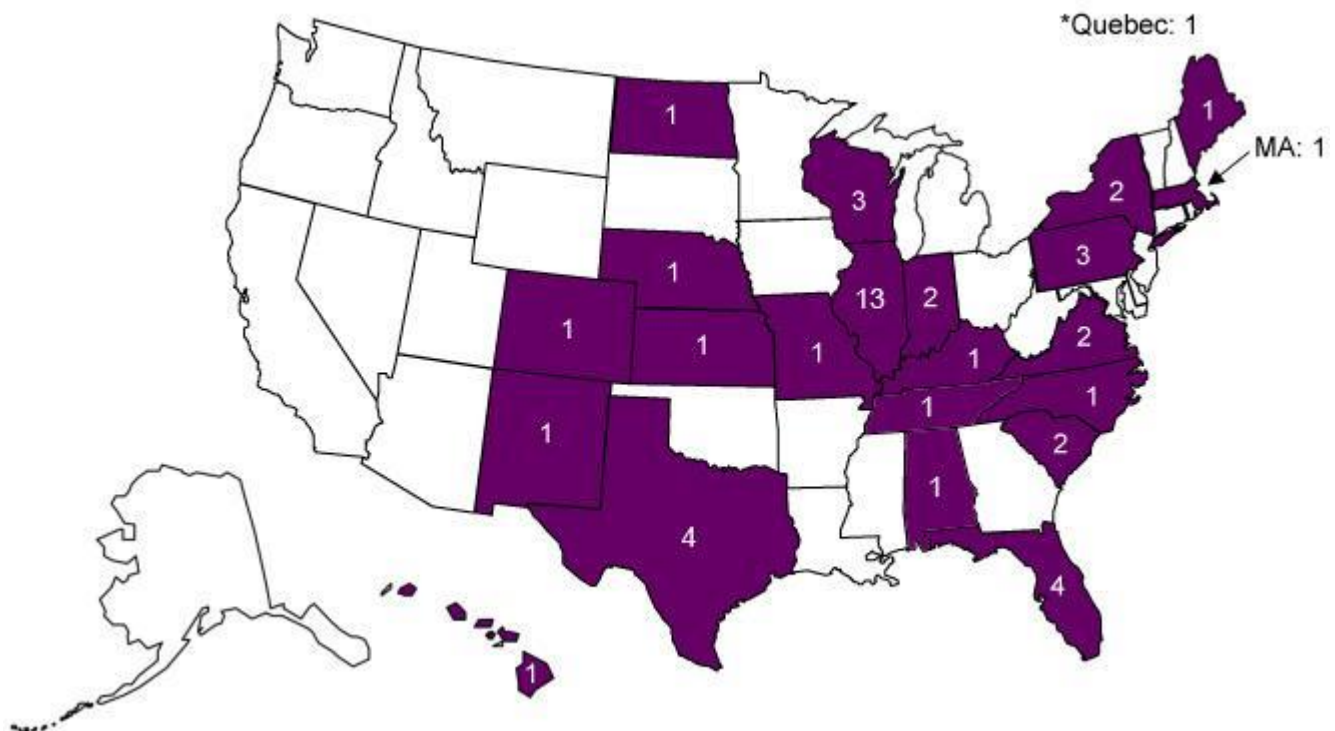
Sixty people with PPA and 60 age-matched control subjects will participate in this study. Participants will be asked to return two years later to compare changes between the two visits.

The materials collected from the study will be used to investigate a variety of topics. Specifically, the goals of this study are:

- To characterize individuals with PPA using neuropsychological testing and brain imaging.
- To investigate naming and word processing problems in PPA and see how it relates to brain changes.
- To increase awareness of PPA, educate others about this unique disorder and encourage more research to eventually develop a treatment.



## Where Do Our Subjects Come From?



## About MRI

MRI, or magnetic resonance imaging, is a special technique that researchers and clinicians use to see the tissues inside the body. For the PPA study, we are looking at the brain. The images obtained will be used to compare with other participants, learn more about the brains of people with PPA, and examine the relationship between brain changes and test performance.

The MRI portion of the study takes about forty-five minutes. You will change into a hospital gown and remove all metallic objects (jewelry, hearing aids, etc.). You will be asked to lie still on your back on a table with a specifically designed headrest. This will keep you from moving your head. After you are positioned, the table will slide into the enclosed portion of the scanner.

The MRI scanner is loud and you may feel a small vibration, but this is normal. To communicate with the staff through an intercom system and to protect you from the noise, you will be wearing headphones specifically designed for MRI. You will have constant contact with the researchers while you are in the scanner.

## About ERP

ERP stands for event related potentials. This non-invasive technique is used to analyze electroencephalogram (EEG) results and to learn about specific functions of the brain. In this type of study, the electric activity of the brain is recorded through electrodes placed on the scalp.

To prepare for the experiment, you will sit down in a comfy chair while research assistants place an elastic EEG cap with small holes over your scalp. After the cap has been put on your head, a small amount of water-based gel is put into each hole. Sensors are then placed on top of each gel stop. You will be asked to perform a variety of cognitive tasks while the sensors record the signals that your brain emits. The tasks last about an hour.

After the experiment is finished, the researchers will take off the cap. You may have some gel remaining in your hair. We will have shampoo, towels and a hair dryer available for you if you prefer. Please bring a comb or brush if you require one.

## Compensation

All participants will be compensated for their participation in the experiment. Travel and accommodations for out of town individuals are covered by the study and are booked in advance by a research assistant. Local participants will have travel expenses reimbursed. Meals are compensated for both local and out of town participants. Additionally, all participants will receive a \$100 per day participation fee.

For more information about this study, please contact:

Benjamin Rader  
Northwestern CNADC  
320 E. Superior Street  
Searle 11th Floor  
Chicago, IL 60611  
Phone: 312-908-9681  
Fax: 312-908-8789  
[benjamin.rader@northwestern.edu](mailto:benjamin.rader@northwestern.edu)

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## Resources for PPA

- IMPPACT, the International PPA Connection: [www.ppaconnection.org](http://www.ppaconnection.org). This website has been launched to foster international collaboration in PPA and also to serve as a compendium of patient-care resources related to PPA throughout the world.
- The Association for Frontotemporal Degeneration: [www.theaftd.org](http://www.theaftd.org)
- The National Aphasia Association: [www.aphasia.org](http://www.aphasia.org)
- University of California, San Francisco Memory and Aging Center: <http://www.memory.ucsf.edu/education/diseases/ppa>