Our goal is to provide exceptional diagnosis and treatment techniques for Auditory Processing Disorders. At Palmetto SpOT, APD diagnosis and treatment is a task that is completed by a team of Audiologists, Speech Therapists and Occupational Therapists. Because APD can manifest in many different forms, it is essential that all three of these professions work together to fully understand the effects that APD has on each child. Our team of professionals will form an individual treatment plan based on the individual child and their independent needs.

While auditory processing disorder (APD) isn't as well known as attention deficit disorder (ADHD or ADD), it is becoming increasingly common. Roughly 7 percent of children have some type of auditory processing difficulty.

But what is it exactly? At its most general, APD is a glitch in the brain's ability to filter and process sounds and words. An APD child doesn't have difficulty hearing – in fact, in most cases, their hearing is good. Rather, the brain perceives the sounds incorrectly, affecting the child's ability to distinguish between similar sounds (da and ga, for example).

Some children with APD also have trouble screening out background noise, so they pick up bits of surrounding sounds. The echo in a gymnasium or the hum of the air conditioner in the classroom interferes with the conversation at hand. It's like listening to the radio with interference from other stations garbling the reception.

A child with the disorder typically tries so hard to understand what's being said that they forget parts of the conversation or don't pick up on the nuances or subtleties of the words. Combine APD with ADHD, and a child's abilities to listen and remember are severely compromised.

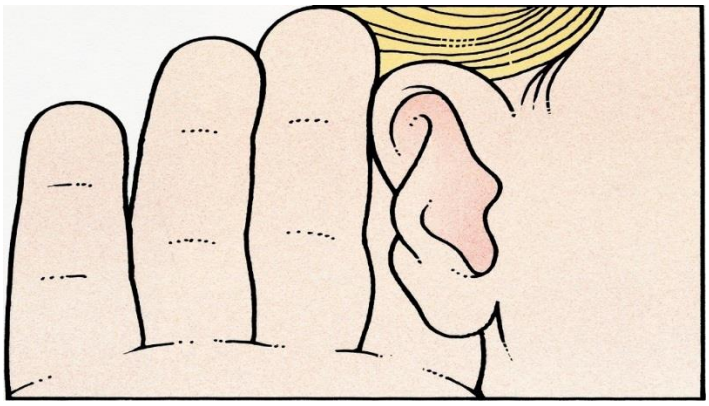
Sorting Out Symptoms

Just as APD can affect a child's ability to focus, so an attention deficit can affect auditory processing. Symptoms of the two disorders often overlap. Studies suggest that 50 percent of those diagnosed with ADHD may also have APD. Experts continue to disagree whether APD is a manifestation of ADHD, or if they are separate disorders.

How can a parent tell if his or her ADHD child has APD? In general, children with ADHD exhibit inattention, distractibility, and hyperactivity in any environment. Children with APD, on the other hand, usually don't have difficulty focusing and paying attention in a quiet space. But many children with APD are exquisitely sensitive to sound. In fact, some sounds can "hurt" – a blender, a train engine, police sirens.

“Children with ADHD may be poor listeners and have difficulty understanding or remembering verbal information,” explains Teri James Bellis, author of *When the Brain Can’t Hear* but “it is the attention deficit that is impeding their ability to access or to use the auditory information that is coming in,” not the processing of it in the brain. Recognizing a connection between sensory processing and attention can be a key focus point.

Executive functioning skills are mental skills that allow us to manage every aspect of our lives! Attention, problem solving, flexible thinking, working memory, self-control, and even emotional control are executive functioning skills that allow us to manage day-to-day tasks, stay safe, and get things done. When executive functioning is a challenge, you’ll see trouble with planning, prioritization, organization, and staying on a task. Behavioral inhibition or emotional inhibition are part of executive functioning too.



The Cause

The underlying cause of APD isn’t known. Experts debate whether heredity or environment – or both – are responsible for the condition. While the human auditory system is fully developed at birth, auditory pathways don’t mature until the age of 10 to 12. Because of this, early influences – such as poor prenatal nutrition, a mother’s exposure to cigarettes or alcohol, childhood malnutrition, and chronic ear infections – may negatively affect auditory processing. Premature birth, low birth weight, Lyme disease or other brain infections, closed head injury, and exposure to low levels of heavy metals (lead or mercury) may also play a role. The good news is that, because the auditory pathways continue to develop up until adolescence, APD is responsive to early intervention.

Three Disorders in One

Jack Katz, M.D., a pioneer in the field of auditory processing disorder, says that APD comprises three distinct conditions that often overlap but may occur in isolation.

Sound discrimination problems. When children learn to talk, they mimic the sounds they hear to produce speech. A child with APD may not speak clearly, using similar (“dat” instead of “that”; “free” instead of “three”) rather than exact sounds long after peers have corrected themselves. Typically, children with faulty sound discrimination will run words together and drop word endings and un-emphasized syllables when speaking. Reading and spelling may also be affected.

Auditory memory problems. This part of the disorder makes it difficult for a child to memorize numbers and facts, and also affects their reading and language skills. Children with auditory memory problems typically take longer to learn their telephone numbers and addresses, and have difficulty remembering basic math facts. Verbal instructions and lists are similarly tough to retain.

Language processing problems. This component of APD is the most troublesome. It affects a child's abilities to understand what's being asked of them and to socialize with peers. A child with this cognitive glitch has trouble taking oral tests and becomes confused when reading and telling stories with lots of characters and events. They will often pass up a chance to hold a conversation because of the time it takes to process words being spoken and to formulate responses.

Christina suffered from all three elements of APD. She never sang as a small child, even though she clearly enjoyed listening to music and to others' singing. "Christina could never put everything together – the words, the rhythms, the tunes," says her mother, Tricia. "Her hearing was fine – exceptional. But put her into a circle of kids singing nursery rhymes and playing spoons and tambourines, and all she wanted was to get away!" When Christina was finally diagnosed with APD, Tricia was relieved.

Diagnosing APD

"Not all language problems are due to APD, and not all cases of APD lead to language and learning problems," cautions Bellis. APD isn't diagnosed by checking off a laundry list of symptoms.

The only way to diagnose the condition is with a battery of tests, performed by a team of therapists. These tests are administered to assess a patient's overall processing capability and how it relates to the patient's day to day functioning. Audiology, Occupational Therapy and Speech Therapy evaluations are usually completed to paint a picture of the patients overall processing capabilities.

A child should be at least 5 to 6 years old before undergoing testing. "The symptoms you commonly see in a 3- or 4-year-old are sound sensitivities and difficulties discriminating between sounds, which you'll hear in their speech," explains Wendy Tepfer, a speech and language pathologist in New York City. "They need to work with an expert in APD." When a child reaches school age, however, Tepfer advises that APD may begin to compromise academic success. "At that age, I would recommend evaluation for APD," she says, "because now, it's not only the language but also his performance in the classroom. To manage the disorder, the student may need remediations other than speech and language therapy. A full evaluation will help you know what those are."

The Treatments

APD can be treated from childhood through adolescence – when the auditory pathways stop developing – and even later, although experts agree that the earlier the diagnosis and treatment, the better. As with ADHD, a combination of professional, school, and home therapies is most effective.

Unlike ADHS, APD can not be treated with medication. A study conducted at the State University of New York in Fredonia looked at the effects of Ritalin on auditory processing in children with both ADHD and APD. The drug didn't improve auditory processing, despite improving children's performances on a standard test that measured attention and impulsivity.

Working with a Professional at Palmetto SpOT

Treatment includes a wide variety of exercises that target specific auditory deficits. Therapy can range from computer-assisted software to one-on-one training with a speech and language therapist and/or occupational therapist. Both Speech and Occupational therapy will help the patient learn compensatory strategy approaches. The methods help people with APD take responsibility for listening success and failure with active listening and problem-solving techniques. These can include strategies as simple as teaching students to ask for clarification or repetition of instructions.

Speech therapy can improve reading and language comprehension. People with APD have difficulty differentiating sounds. They may mishear, or mis-say 'that' for 'cat,' or 'dead' for 'bed,' for example. Working with a trained therapist can improve their ability to make and understand these sounds. Therapy includes a wide variety of exercises that target specific auditory deficits. Occupational therapists implement a 'head-to-toe' approach to how APD interacts with other neurological mechanisms and how the overall neurological system reacts to the difficulties that are stemmed from APD and overall sensory (non-verbal) processing mechanisms.

The type, frequency, and intensity of therapy should be tailored to the intensity and type of APD present. Here are some common approaches:

- **To overcome sound discrimination problem**, a therapist trains the child's brain to differentiate sounds – first in a quiet environment, then with increasingly louder background noise.
- **Modifying the environment to reduce or eliminate certain sounds**, along with teaching skills to compensate for the disorder, in some cases, working with an audiologist to improve the auditory deficit itself. In some cases, a patient may use an electronic device to aid in listening as well. This device is called an FM system and can be prescribed by an Audiologist to be used in the classroom.
- **To sharpen auditory memory**, the therapist uses sequencing routines – having the child repeat a series of numbers and directions – to exercise the listening "muscles."
- **To manage language-processing problems**, a therapist will train and encourage a child to ask a teacher, adult, or peer to repeat or rephrase an instruction or comment. The therapist and child might also work on developing a customized note-taking system that enables them to capture the information being taught in the classroom.

- On a daily basis, our therapy providers witness the strong connections between attention and memory, and their influence on *function*. They're also able to prescribe ***customized therapy programs*** that ameliorate each level of auditory processing needed to carry out a task. Activities that work multiple systems while strengthening the foundation of function help to streamline therapy and meet goals. *This wholistic approach is a hallmark of the occupational therapy profession*. One example is ***The Listening Program*** when an occupational therapist will work with the patient and their family on this clinic/ home based program:

ADVANCED BRAIN TECHNOLOGIES

Memory and attention work together in the brain to form the basis of our cognitive abilities. Attention is the ability to process information—sometimes selectively—and memory is the ability to store that information for retrieval as needed. This foundation impacts everything we do, including basic cognitive tasks (such as brushing our teeth) and more complex tasks (like playing a musical instrument).

Auditory Feedback is a natural process in the human body that helps us understand and modulate sound and speech signals in real time. When we speak, our ears receive the signal, and our brains make sense of it. In the case of vocalizations, and to a greater extent speech, our brains modulate the productions in real time so that we can quickly adapt, ensuring our message is accurate. Simply using the auditory feedback system—or *auditory feedback loop*—is one way to ensure that memory and attention continue to work well. We do this every day by listening to sounds and speaking.

In order to improve these skills, we need to challenge the brain in specific ways. We know that the brain is plastic; it is a living organ that changes and adapts to the needs of the body. If someone stops using their left arm, the brain will strengthen connections to the right arm to compensate. Furthermore, the neural connections that aren't being used for the left arm will start to deteriorate, which is hard evidence for the "use it or lose it" adage.

One of the tools that we use to improve the efficiency of the auditory feedback system at Palmetto SpOT is *The Listening Program*. The Listening Program® is a neuroscience-based music listening therapy for achieving optimum brain health and functioning.

The Listening Program can be used for a variety of treatments. Our Occupational Therapy team focuses on the following components with our APD patients:

Sensory Processing

Improve sensory processing issues in children, teens, and adults

Inefficient and atypical sensory processing can make daily activities including learning, socializing, and communicating difficult. Grooming, toilet training, and eating can be struggles when the brain is not effectively processing information from the body's sensory receptors. Advanced Brain Technologies' programs can help kids and adults with sensory processing issues increase their tolerance for everyday sensations, improve their coordination and balance, and experience greater comfort in their environment.

Examples:

- Listening
- Following directions
- Anxiety
- Focusing
- Sensitivity
- Communication
- Hyperactivity
- Overreactions to sensations

Executive Function

Make everyday life easier by improving executive function skills

Whatever challenges life presents, stronger executive function can help. In an era of information overload, many people want to become less impulsive and reactive to stressors, more focused and organized, and better able to make good decisions. Individuals with ADHD or other conditions involving weak executive function will especially appreciate the benefits of neuroscience-based brain-training programs from Advanced Brain Technologies.

Examples:

- Attention
- Memory
- Behaviour
- Organization
- Time management
- Self-control
- Impulsivity management

Problem Solving

Increase problem-solving skills for greater creativity, adaptability, and strategizing

Complex problems require flexible thinking and effective strategizing. Advanced Brain Technologies programs improve the brain's executive function, reducing impulsivity and emotional reactivity. Slowing down to strategize, plan, and solve problems can be much easier than ever before.

Examples:

- Creativity
- Memory
- Adaptability
- Cognitive functioning
- Planning
- Organization
- Prioritizing
- Time management

Focus

Address attention deficits for increased focusing abilities and better concentration

Demands on attention can reduce the ability to concentrate for long periods of time or remain focused. By stimulating areas of the brain associated with concentration and focus, the neuroscience-based Advanced Technologies programs can help anyone can address minor or even major attention deficits, improve focusing skills, and reduce impulsivity and learning difficulties.

Examples:

- Attention deficit hyperactivity disorder (ADHD) including inattentive type and mixed type
- Executive function
- Organization
- Learning
- Memory
- Perseverance

At School
Classroom accommodations can often include:

- **Improving the acoustics** – closing a window, shutting a door, adding a rug – can help an APD child "hear" the teacher.
- **Seating a child in the front of the classroom**, away from students who might be disruptive, will also enhance a child's ability to listen.
- **Asking a teacher to face a child, speak slowly**, and use simple sentences when giving assignments can help an APD student retain the information. Writing instructions on a blackboard or a piece of paper can reinforce what was said.

At Home
The following tips will increase a child's ability to listen when he or she is at home:

- **Don't try to have a significant conversation** when the child is in another room, watching television, or listening to music – or when an appliance is running.
- **Before you start a conversation**, be sure the child is ready to listen (finished with what they were doing). Also, face them directly and make sure they're looking at you.
- **Speak slowly and use simple, short sentences**; pause between ideas.
- **Encourage the child to ask you to repeat** something that he or she doesn't understand.

Christina, now 11, has learned to use the latter strategy – asking questions until she grasps what's being said – with friends, parents, and teachers. "It's been successful for her," says Tricia. Eight years of speech and language therapy have helped her daughter accomplish many of her social and academic goals.

But Christina did something that her mother thought she'd never achieve – joining the chorus. "There she was, on stage, at the parents' day assembly, singing her heart out, and playing drums!" says her mother. "She was so proud of herself, and I was the only fourth-grade mom with tears streaming down her cheeks."

Treating APD with Lifestyle Changes

Since auditory processing difficulties vary based on surroundings and development, its therapies vary by setting and age as well. The following lifestyle changes can make a difference for children and adults with APD.

At school, teachers can:

- Improve classroom acoustics. APD makes it hard to screen out background noise. Adding bookshelves, carpeting, and drapes to a classroom absorbs the extra sound.
- Seat children near the front of the class, away from an open door or a pencil sharpener or other classroom items that make noise, like fans or fish tanks.
- Provide attention prompts. Periodically touch her shoulder to remind her to focus.
- Streamline communication. Establish eye contact and insert pauses to allow time for sorting information. Ask questions to see if the child is following the lesson, and rephrase material that has been misunderstood.
- Use visual aids. Jot instructions or key words on the board, and provide simple written or pictorial outlines.
- Build in breaks. Children with CAPD have to work harder than do other kids to pay attention, and may need more frequent downtime to consolidate information.
- Use a microphone and headset (an FM system). The teacher's voice is amplified through a microphone connected to the student's headset or personal earpieces. This technology is sometimes available through their smartboard and helps to focus attention on the teacher.
- Ask children, "What are you going to do? What did I ask you to do?" This will give teachers a chance to determine if children have misheard directions.

At home, parents of kids with APD can:

- Boost auditory attention with games and tapes. Games like Simple Simon teach a listening strategy and provide a chance to practice. A story tape, such as Peter Pan, can have the same benefit. Each time Captain Hook sees the crocodile, have your child raise his hand.
- Look ahead. Go over the basic concepts in upcoming assignments and help your child learn any new words that show up.
- Develop routines. Provide a structure to help your child focus in chaotic environments. Before going to his school locker, for instance, have him check his assignment book and list what he needs to take home.

Your therapists will review all of this information with you and together will formulate a treatment plan for your child. If you have questions, do not hesitate in reaching out to us. We are looking forward to working with your family to meet your child's therapy goals!