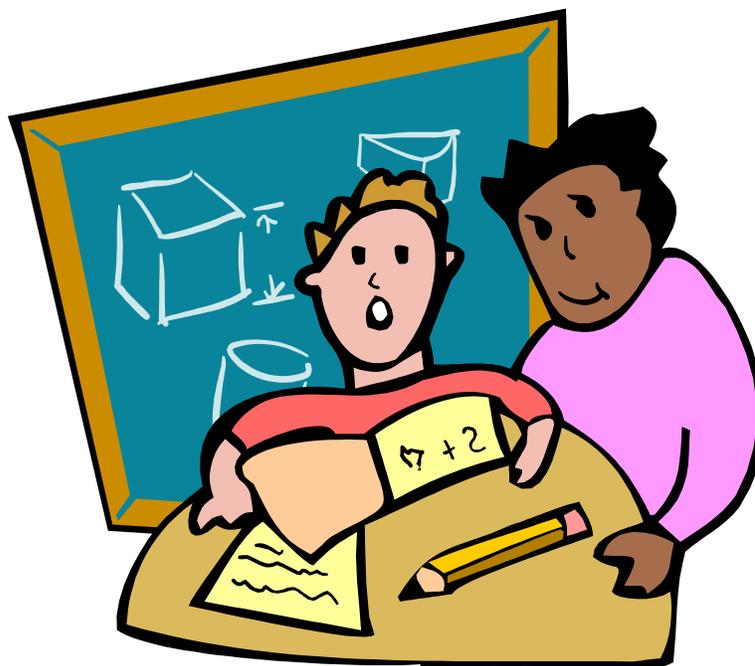


Parent Information Package Auditory Processing Disorders Part I: Testing and Diagnosis



Surrey Memorial Hospital
Rehabilitation Services Department
AUDIOLOGY
Phone: 604-585-5674 FAX: 604-585-5568

What is an Auditory Processing Disorder and How is it Diagnosed?

1. What is an Auditory Processing Disorder (APD)?

Auditory Processing is how we receive, represent, symbolize, comprehend, interpret, store and recall auditory information. In other words, *it is what we do with what we hear*.

Auditory Processes include, amongst other abilities, the following:

- **Auditory Attention:** the ability to detect the presence or absence of a sound.
- **Sound Localization/Lateralization:** the ability to determine the position of a sound source relative to one's position in space or to determine which ear the sound is coming from.
- **Auditory Discrimination:** the ability to differentiate between sounds of different frequencies (pitch), intensities (loudness) and duration.
- **Discrimination of Speech in Noise (Figure Ground):** the ability to selectively listen to speech in a background of noise.
- **Auditory Attention Span:** the ability to direct attention to the relevant acoustic signal, and sustain that attention for an age-appropriate amount of time.
- **Auditory Synthesis:** the ability to merge or blend isolated speech sounds into words.
- **Auditory Closure:** the ability to fill in missing sounds to recognize the whole signal (e.g. a degraded signal).
- **Auditory Recognition:** the ability to identify a sound as part of one's experiences; fundamental skill for developing auditory memory.
- **Auditory Short-term Memory:** the ability to retain auditory information as immediately presented.
- **Auditory Sequential Memory:** the ability to recall the order of a series of details.
- **Auditory Pattern Recognition:** the recognition of sound patterns.
- **Auditory Separation:** the ability to process an auditory message coming into one ear while ignoring a different message being presented to the opposite ear at the same time.
- **Auditory Integration:** the ability to process information being presented to both ears simultaneously, with the information being presented to each ear being different.

These Auditory Processing skills generally mature with age and typically become adult-like in adolescence.

An Auditory Processing Disorder (APD) is when one or more of these processes do not function properly. The American Speech and Hearing Association (ASHA) defines an Auditory Processing Disorder (APD) as: "those deficits in information processing of auditory signals that are not attributed to impaired peripheral hearing sensitivity or intellectual impairment" (ASHA, 1992).

APD may also be called: Central Auditory Disorder, Central Auditory Dysfunction, Auditory Perceptual Disorder, Auditory Perceptual Dysfunction, Auditory Language-Learning Disorder, Non-Sensory Hearing Impairment. When it affects language comprehension severely, the diagnosis may be referred to as Receptive Aphasia or Auditory Agnosia.

2. What are the causes of APD?

In some cases the underlying cause of APD may be due to a delay in the maturation of the central auditory processes. In other cases APD may be due to a specific problem with the auditory system. Further more, auditory processing performance can be affected by attention difficulties such as Attention Deficit Disorder (ADD/ADHD).

The incidence of APD, or how common it is, is unknown and is difficult to determine. However, APD is more common in males with normal hearing, who may have allergies and have a significant history of middle ear problems (chronic middle ear fluid or ear infections). Some studies are finding APD to be linked to genetic traits. Students with APD are often categorized as part of a larger group of children with language or learning disorders. These disorders can affect academic achievement and social skills and can influence general emotional adjustment.

3. What are the symptoms associated with Auditory Processing Disorders?

Behaviours of a child who may have APD can include:

- Says “huh” or “what” frequently
- Gives inconsistent responses to auditory stimuli
- Often misunderstands what is said
- Constantly requests that information be repeated
- Has poor auditory attention
- Is easily distracted
- Has difficulty following oral instructions
- Has difficulty listening in the presence of background noise
- Has difficulty with phonics and speech sound discrimination
- Has poor auditory memory (span and sequence)
- Has poor receptive and expressive language
- Gives slow or delayed responses to verbal stimuli
- Has reading, spelling, phonics and other academic problems
- Learns poorly through the auditory channel
- Exhibits behaviour problems

In quiet one-on-one situations these children may do quite well. **These difficulties are more pronounced when listening situations become more challenging** (e.g. speech is distorted or very little repetition or clarification is provided, the language used is too complex or too much information is given, there are competing speakers, there is background noise or the acoustic environment is poor). These kinds of situations can often occur in a classroom where at least 45% of the school day is spent engaged in listening activities. As a result of their processing difficulties, children with APD can fall behind academically, which can in turn negatively affect their self-esteem and potentially lead to behavioural problems.

4. What other disorders look like APD?

- Attention Deficit Disorder (ADD/ADHD)
- Global Developmental Delay
- Specific Language Impairment
- Autism Spectrum Disorder
- Asperger’s Syndrome

Talk to your pediatrician if you have concerns that your child may have any of the above disorders.

5. How is APD diagnosed?

i) First, APD is suspected...

- ◆ Parents and teachers may have requested multiple hearing tests because they suspect that the child is not hearing instructions, but results usually have found adequate or normal hearing.
- ◆ A child may be demonstrating academic difficulty which may lead to psycho-educational and/or speech language testing. The School Based Team may find evidence of processing difficulties.

ii) Then a referral for APD testing is made...

- ◆ A collaborative team approach to making a diagnosis of an Auditory Processing Disorder is necessary. **It is therefore required that a recent speech and language assessment as well as a psych-educational assessment be available for review prior to auditory processing testing being done.**
- ◆ This allows those involved, usually a child's teacher, special educators and speech language pathologist, to develop the best possible individualized treatment program. It is particularly important that the parents also be involved to understand their child's difficulties and ensure recommendations are implemented.
- ◆ Other possible explanations (e.g. vision, language, attention, psychological factors, etc.) need to be examined. Their influence on the child's auditory processing abilities needs to be reviewed. Therefore, in our clinic, we require that a child has undergone psycho-educational and speech language testing prior to our testing. This identifies other areas of strengths and weaknesses.
- ◆ **If there is any concern that the child may have ADHD/ADD this needs to be addressed prior to APD testing. A child who has been diagnosed with ADHD/ADD and is still having difficulties can only be tested once his or her ADHD/ADD is being managed.**

iii) An APD appointment is scheduled...

- ◆ An Auditory Test Battery usually takes several hours over 3-4 sessions depending on the age of the child and the selection of tests.
- ◆ A detailed case history is needed before an APD test battery is performed. Information is collected before the assessment through copies of reports from the school personnel involved (Speech/Language Pathologist, school psychologist, LAC teacher), other professionals (private testing). Further details about the case history are obtained or clarified through discussion with the child and parent at the assessment.

Next, the overall functioning of the peripheral auditory system is investigated to rule out hearing loss as a contributing factor. This includes a pure tone audiogram and physiological tests such as:

- Tympanometry
- Acoustic Reflexes
- Auditory Brainstem Response
- Otoacoustic Emissions

If middle ear disease or sensorineural hearing loss is found, a child is referred for medical and or audiological consultation for appropriate treatment. APD testing will be postponed until any middle ear problems have been treated and APD is still suspected.

iv) Then the Auditory Processing abilities are assessed...

- ◆ Tests are performed in a sound treated room using properly calibrated equipment with carefully controlled input and output levels.
- ◆ Tests are scored taking into consideration the child's age and ability to complete each task. For younger children, attention and the clarity of their speech can affect their test outcomes. **Children are required to have expressive and receptive language skills at an 8-year old level in order to proceed with testing.**
- ◆ Audiologists will assess some of the different Auditory Processes by selecting from an array of standardized tests. These could include:
 - Repeating words when there is competing background noise,
 - Clearly repeating "muffled" (filtered) speech, filling in missing information,
 - Repeating back numbers, words or sentences from one or both ears when presented to both ears simultaneously,
 - Copying a pattern sequence, humming or tapping out a pattern that is heard,
 - Etc.
- ◆ Specific Auditory Processing tests will be chosen according to the child's areas of difficulty that have been revealed by the case history, and the child's age and abilities.

v) The individual's APD test scores are compared to normative information...

- ◆ Interpretation is made in the context of previous reports from other professionals. The audiologist may also consult with the Speech Language Pathologist, Psychologists, teachers, and other team members at this point. Caution must be applied in interpreting results if the child has English as a second language. A report will be compiled and sent out to the referring doctor and other professionals as requested by parents. **This may take several weeks to complete.**
- ◆ Some children may show strong evidence of APD while others may have only mild difficulties with specific auditory skills. Recommendations are tailored for each child individually based on the profile of the test results. The team, along with the audiologist, will suggest the best strategies to help the child.
- ◆ Sometimes, a delay in the maturation of the auditory system is suspected. Children may be asked to return in a year or two to monitor for improvement in their processing abilities.
- ◆ The parents and the school based team are expected to take the responsibility for implementing and monitoring management strategies and recommendations.