

## Brain Development & Hearing Loss

Hearing typically starts at 4 months gestation. It contributes to the early foundation of development of neurons – the basis of language and future learning.

**Human Brain Development**  
Neural Connections for Different Functions Develop Sequentially

[http://developingchild.harvard.edu/index.php/resources/briefs/inbrief\\_series/inbrief\\_the\\_science\\_of\\_ecd](http://developingchild.harvard.edu/index.php/resources/briefs/inbrief_series/inbrief_the_science_of_ecd)

## Brain Development – why hearing aids can't wait

- Due to prenatal development, each neuron in the brain has approximately 2,500 synapses, or connections.
- Consider the auditory / visual cortex as early roots in a spring garden, ready to grow.

## Brain Development – why hearing aids can't wait

- As a result of **constant sensory stimulation** and experiences, the number of synapses grows to 15,000 synapses per neuron by the time a child is 2–3 years old.
- Think of this stimulation as rain, nutrients, sunshine – all needed for a garden to grow
- Consistent amplification wear, meaningful communication, experiences grow the brain

## Brain Development – why hearing aids can't wait

- Consider the auditory and visual cortex as neighboring gardens in the same yard.
- The stimulation will drive the growth of the synapses from each of the neurons
- Without constant stimulation, the auditory cortex is minimized and visual cortex enhanced.

## Brain Development – why hearing aids can't wait

- At age 2–3 “synaptic pruning” starts to happen. The weaker synaptic contacts are eliminated while stronger connections are kept and strengthened.
- A baby's experiences determine which connections in the brain will be strengthened and which will be pruned away. The ineffective, unused or weaker auditory connections are “pruned” away.
- Sensory cortex matures by age 6. Our ‘window’

## Brain access tools

- The best predictors of verbal language skill development are
  - the child's age when full time hearing aid use started
  - the degree of the child's hearing loss
  - the amount of his/her exposure to meaningful listening experiences.
- Using technology, hearing ability must be provided as close to the typical hearing level as possible if the family wants the child to learn to listen and use spoken language.