



**AUTISM/ A.D.D. RESOURCES INC.**  
25947 Gold Beach Drive S.W.  
Vashon Island, Washington 98070  
Phone (206) 463-5237 Fax (206) 463-2594

**Michael R. McCarthy, MSc PhC QMRP**  
E-Mail: [earait@aol.com](mailto:earait@aol.com)

**Marcialyn McCarthy, MAEd**  
Website: [www.aitresources.com](http://www.aitresources.com)

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## PET Imaging

### **An Objective Measure of AIT Efficacy**

A PET Scan single subject study – This study was presented at the 1994 Autism Society of America Conference in Las Vegas, Nevada. By Stephanie Zarella, Advance Assistant Editor. From the June 26, 1995 issue of ADVANCE for Speech-Language Pathologists & Audiologists

This article has been summarized by Marcy McCarthy

Usually the outcomes of therapies such as Auditory Integration Training have been judged by pre and post behavioral surveys. In order to provide more solid, objective observations of the procedure, researcher Jackie Cimorelli, PhD, CCC-SLP, director of the Division of Communication at the University of North Carolina in Greensboro, took the process of observation one step further when she utilized positron emission tomography (PET) technology.

Dr. Cimorelli advised Melanie Highfill, MS, CCC-SLP in a case study using the PET procedure to document physiological changes possibly due to AIT. Many of the problems arising from the studies of the effects of AIT are from relying upon subjective data supplied by practitioners, therapists, parents and teachers. Because many of the patients going through AIT are developmentally delayed and often have poor verbal skills. Highfill and Cimorelli suspected that the AIT effects went beyond the auditory effects often reported and hypothesized a cortical change as well.

A PET scan provides a radiological measure of chemical changes in cortical blood flow. A change in brain blood flow may mean that the brain is being utilized differently than before the training. This is a single case study, where the subject was an 8 year old male, with a diagnosis of autism and prior to the AIT was thought to have accompanying mental retardation.

The pre-AIT PET procedure revealed an abnormal measure of the blood flow in the frontal lobes of the brain. Specifically it was called hypermetabolism in the frontal lobes of the brain. They would normally see activity in the occipital area of the brain, Highfill explained.

After the first scan, the child went through AIT for 2 weeks. Throughout the AIT process, the speech-language pathologists observed that the child was improving in global cognitive and behavioral areas. The child was non verbal, but was able to follow simple instructions and appeared to be attentive. Prior to the beginning of AIT, he was unable to sit still, but while going through the therapy, he gradually began to do simple paper and pencil work. As the subject completed AIT, he was eliciting monosyllabic words, working puzzles and scribbling on papers with markers without guidance or assistance.

The second PET scan was completed the day after AIT. The scan was consistent with the boy's new behaviors. The picture showed decreased hypermetabolism in the frontal lobe and increased activity in the visual cortex, located in the occipital lobe. In order to bring a more longitudinal aspect to the study, the radiologist suggested another post-AIT scan after six months. The results sustained in the third scan. The blood flow in the frontal lobes of the brain maintained a decreased level of activity while the occipital lobe increased its level of activity. According to the radiologist, the scans were approaching normal levels. During the final visit to the PET scan lab, the boy greeted the radiologist and remained cooperative during his blood work in the laboratory. Prior to the AIT, he was self-stimulating

and difficult to control. As time passed, the boy's behavior continued to improve and he became increasingly communicative. He is able to answer questions and requests and is beginning to speak in two-word combinations, Highfill comments. He is able to use a communication board to supplement his emerging verbal abilities.

Prior to AIT he was tested as functioning at the 13 to 15 months range receptively and in the 8 to 10 month range expressively. Six months later, he was performing at the 26 to 29 months receptively and at 21 to 24 months expressively. According to Highfill, he gained a little over a year developmentally in six months' time.

Highfill and Cimorelli would like to continue their research in this area, however due to the high costs of PET scans (\$3,000 or more per scan); this would mean conducting a very high cost study. They hope that this study contributes to the whole picture of AIT, autism and other developmental disabilities.

*For more information, contact Melanie Highfill, Center for Development of Communication and Learning, 1336 Westgate Dr., Winston- Salem, NC 27103; (910) 659- 7956*