

April 2014 Live Seminar Updates

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Magnetic Field Correlation Imaging (MFC) To Diagnose AD/HD?

“Stimulant medication reduces symptoms in attention-deficit/hyperactivity disorder (ADHD) through indirectly increasing dopamine (DA) levels in the striatum. Hence, it is suspected that reduced DA levels are part of ADHD pathology. However, both increased and decreased DA markers have been detected in ADHD. Interestingly, reduced DA markers have been consistently found in medication naïve patients while increased markers have been found in patients with a history of medication use, suggesting increased DA markers may reflect an adaptive response to medication. Here we assess the relationship between medication history and brain iron levels in children and adolescents with ADHD compared to typically developing controls (TDC). As brain iron is required for DA synthesis, assessing iron levels with MRI may provide non-invasive indirect measures of DA...”

Magnetic Field Correlation Imaging (MFC) To Diagnose AD/HD?

Similar to other DA marker measures, lower brain iron levels (indexed only by MFC) are observed in medication naïve ADHD and appear to normalize with medication.

CLINICAL RELEVANCE/APPLICATION

Reduced brain iron in medication naïve ADHD is a promising biomarker. MFC imaging's ability to non-invasively detect these aberrant levels may help improve ADHD diagnosis and guide optimal treatment.

Adisetiyo, V., et al. (December 2, 2013). Medication Naïve Attention-deficit/Hyperactivity Disorder Subjects Have Low Brain Iron Levels as detected by Magnetic Field Correlation Imaging. Paper presented at the Radiological Society of North America Conference, Oak Brook, IL, session: SSE21: Code: SSE21-06. From website: <http://www2.rsna.org/timssnet/rsna/media/pr2013/Adisetiyo/abstract/Adisetiyo-ADHD-Abstract-LH.pdf>.

ADHD Neurobiology Confirmed

“The superior colliculus is a hub for multisensory integration necessary for visuo-spatial orientation, control of gaze movements and attention. The multiple functions of the superior colliculus have prompted hypotheses about its involvement in neuropsychiatric conditions, but to date, this topic has not been addressed experimentally. We describe experiments on genetically modified mice, the *Isl2-EphA3* knock-in line, that show a well-characterized duplication of the retino-collicular and cortico-collicular axonal projections leading to hyperstimulation of the superior colliculus. To explore the functional impact of collicular hyperstimulation, we compared the performance of homozygous knock-in, heterozygous knock-in and wild-type mice in several behavioral tasks requiring collicular activity. The light/dark box test and Go/No-Go conditioning task revealed that homozygous mutant mice exhibit defective response inhibition, a form of impulsivity...”

ADHD Neurobiology Confirmed

“...This defect was specific to attention as other tests showed no differences in visually driven behavior, motivation, visuo-spatial learning and sensorimotor abilities among the different groups of mice. Monoamine quantification and gene expression profiling demonstrated a specific enrichment of noradrenaline only in the superficial layers of the superior colliculus of Isl2-EphA3 knock-in mice, where the retinotopy is duplicated, whereas transcript levels of receptors, transporters and metabolic enzymes of the monoaminergic pathway were not affected. We demonstrate that the defect in response inhibition is a consequence of noradrenaline imbalance in the superficial layers of the superior colliculus caused by retinotopic map duplication. Our results suggest that structural abnormalities in the superior colliculus can cause defective response inhibition, a key feature of attention-deficit disorders...”

Reference

Mathis, C, et al. (March 20, 2014). Defective response inhibition and collicular noradrenaline enrichment in mice with duplicated retinotopic map in the superior colliculus. Brain Structure and Function. DOI: 10.1007/s00429-014-0745-5.

The Brain's Anti-Distraction System

“To find objects of interest in a cluttered and continually changing visual environment, humans must often ignore salient stimuli that are not currently relevant to the task at hand. Recent neuroimaging results indicate that the ability to prevent salience-driven distraction depends on the current level of attentional control activity in frontal cortex, but the specific mechanism by which this control activity prevents salience-driven distraction is still poorly understood. Here, we asked whether salience-driven distraction is prevented by suppressing salient distractors or by preferentially up-weighting the relevant visual dimension. We found that salient distractors were suppressed even when they resided in the same feature dimension as the target (that is, when dimensional weighting was not a viable selection strategy). Our neurophysiological measure of suppression—the P_D component of the event-related potential—was associated with variations in the amount of time it took to perform the search task: distractors triggered the P_D on fast-response trials, but on slow-response trials they triggered activity associated with working memory representation instead. These results demonstrate that during search salience-driven distraction is mitigated by a suppressive mechanism that reduces the salience of potentially distracting visual objects” (p. 5658).

Reference

Gaspar, J.M., et al. (April 16, 2014). Suppression of Salient Objects Prevents Distraction in Visual Search. Journal of Neuroscience, 34(16), 5658-5666. DOI: 10.1523/JNEUROSCI.4161-13.2014.

Social Skills in Children with Traumatic Brain Injury (TBI)

“Objective: To examine the association between right frontal pole cortical thickness, social competence, and cognitive proficiency in children participants with a history of chronic traumatic brain injury (TBI)...Conclusions: The association between right frontal lobe cortical integrity and social competence in pediatric participants with chronic TBI may be mediated through cognitive proficiency.”

Ashley, L., et al. (April 7, 2014). Right Frontal Pole Cortical Thickness and Social Competence in Children With Chronic Traumatic Brain Injury: Cognitive Proficiency as a Mediator. Journal of Head Trauma Rehabilitation, DOI: 10.1097/HTR.0000000000000040.

Why so Many Comorbidities with Dyslexia?

“Comorbidity among developmental disorders such as dyslexia, language impairment, attention deficit/hyperactivity disorder and developmental coordination disorder is common. This study explores comorbid weaknesses in preschool children at family risk of dyslexia with and without language impairment and considers the role that comorbidity plays in determining children's outcomes...Comorbidity between developmental disorders can be observed in the preschool years: children with language impairment have significant and persistent weaknesses in motor skills and executive function compared to those without language impairment. Children's early language and motor skills are predictors of children's later reading skills...” (p. 237)

Reference

Gooch, D. et al. (March 2014). Comorbidities in preschool children at family risk of dyslexia. Journal of Child Psychology and Psychiatry, 55(3), 237-246. DOI: 10.1111/jcpp.12139.

Spatial-Temporal (ST)-Math: Mind Institute

“What is Spatial-Temporal Reasoning? Born out of neuroscience research at the University of California, Irvine, MIND’s unique approach accesses the brain’s innate “spatial-temporal” reasoning ability. This ability, which lies at the core of innovative thinking and sophisticated problem-solving, allows the brain to hold visual, mental representations in short-term memory and to evolve them in both space and time, thinking multiple steps ahead. MIND’s approach consists of language-independent, animated representations of math concepts delivered via the Spatial-Temporal (ST) Math[®] software games...”

Reference

Author (No Date). Reimagining Math Education. Mind Research Institute. From website: <http://www.mindresearch.net/programs/>

Little Help for the Twice Exceptional

“While 7 % of students without disabilities are participating in gifted and talented education (GATE) programs, only 1% of students with disabilities served under IDEA do so. (Note: In 2011 - 12, 7% of children ages 3 - 21 served under the IDEA were classified as having intellectual, as opposed to learning, disabilities that might preclude GATE participation.)” (p. 4).

Author (March 21, 2014). CIVIL RIGHTS DATA COLLECTION - Data Snapshot: College and Career Readiness. Washington, DC: U.S. Department of Education Office for Civil Rights. Issue Brief No. 3. From website: <http://www2.ed.gov/about/offices/list/ocr/docs/crdc-college-and-career-readiness-snapshot.pdf>.

Depression & Anxiety in LD Children

“Both NLD (nonverbal learning disabled, sic.) and RD (reading disabled, sic.) children reported experiencing more generalized and social anxiety than TD (typically developing children, sic.) , the NLD children reported more severe anxiety about school and separation than TD, and the children with RD had worse depressive symptoms than those with NLD or TD.”

Mammarella, I.C., et al. (April 14, 2014). Anxiety and Depression in Children With Nonverbal Learning Disabilities, Reading Disabilities, or Typical Development. Journal of Learning Disabilities. DOI: 0022219414529336.

Poor Reading Comprehension and Oral and Written Expression

“We qualitatively and quantitatively compared the performance of good and poor comprehenders in oral and written narrative tasks with the aim of shedding light on this issue. Regression analyses were also used to explore the role of working memory and vocabulary in explaining individual differences. Our results showed that the two groups produced narratives of comparable length, with similar percentages of spelling mistakes, whereas they differed in terms of the quality of their narratives, regardless of the modality. These differences were qualified by analyzing the children’s use of connective devices, and poor comprehenders were found to use a higher proportion of additive devices than good comprehenders. Regression analyses showed that working memory (particularly the intrusion errors measure) explained a modest part of the qualitative differences in narrative production. Implications for our theoretical understanding of poor comprehenders’ profiles and education are discussed.”

Reference

Carretti, B., et al. (April 7, 2014). Oral and Written Expression in Children With Reading Comprehension Difficulties. Journal of Learning Disabilities. DOI: 10.1177/0022219414528539.

Long-Term Effects of Reading Interventions

“Overall, comprehension and phonemic awareness interventions showed good maintenance of effect that transferred to nontargeted skills, whereas phonics and fluency interventions, and those for preschool and kindergarten children, tended not to.”

Suggate, S. (April 4, 2014). A Meta-Analysis of the Long-Term Effects of Phonemic Awareness, Phonics, Fluency, and Reading Comprehension Interventions. Journal of Learning Disabilities. DOI: 10.1177/0022219414528540.

Thinking Cap?

“Adaptive human behavior depends on the capacity to adjust cognitive processing after an error. Here we show that transcranial direct current stimulation of medial–frontal cortex provides causal control over the electrophysiological responses of the human brain to errors and feedback. Using one direction of current flow, we eliminated performance-monitoring activity, reduced behavioral adjustments after an error, and slowed learning. By reversing the current flow in the same subjects, we enhanced performance-monitoring activity, increased behavioral adjustments after an error, and sped learning. These beneficial effects fundamentally improved cognition for nearly 5 h after 20 min of noninvasive stimulation. The stimulation selectively influenced the potentials indexing error and feedback processing without changing potentials indexing mechanisms of perceptual or response processing. Our findings demonstrate that the functioning of mechanisms of cognitive control and learning can be up- or down-regulated using noninvasive stimulation of medial–frontal cortex in the human brain” (p. 4214).

Reference

Reinhart, R.M.G., et al. (March 19, 2014). Causal Control of Medial–Frontal Cortex Governs Electrophysiological and Behavioral Indices of Performance Monitoring and Learning. Journal of Neuroscience, 34(12), 4214-4227. DOI: 10.1523/JNEUROSCI.5421-13.2014.

Medication Efficacy in Older Adults with AD/HD

“The majority of adults aged 50+ with ADHD reported regular pharmacotherapy for ADHD. Participants currently receiving psychopharmacological treatment for ADHD reported better attention than those not receiving pharmacotherapy. Employment was associated with more favorable outcomes.”

Lensing, M.B, et al. (March 29, 2014). Psychopharmacological Treatment of ADHD in Adults Aged 50+ An Empirical Study. [Journal of Attention Disorders](#). DOI: 1087054714527342.

Symptoms of AD/HD in Older Adults

“Our results suggest that ADHD symptoms decrease with age and that their relationships with co-occurring mood disorders and cognitive performance also change. Although symptoms of depression are lower in older adults, they are much stronger predictors of cognitive performance and likely mediate the effect of ADHD symptoms on cognition in this age group. These results highlight the need for age-appropriate diagnosis and treatment of comorbid ADHD and mood disorders.”

Das, D., et al. (January 28, 2014). Attention Deficit/Hyperactivity Disorder Symptoms and Cognitive Abilities in the Late-Life Cohort of the PATH through Life Study. [PLOS/One](https://doi.org/10.1371/journal.pone.0086552). DOI: 10.1371/journal.pone.0086552.

SCT & Emotional Regulation

“Participants with elevated SCT (12%) had higher ADHD, depressive, and anxious symptoms in addition to poorer emotion regulation and social adjustment than participants without elevated SCT. Above and beyond other psychopathologies, SCT was significantly associated with social impairment but not general interpersonal functioning. SCT was also associated with emotion dysregulation, even after accounting for the expectedly strong association between depression and emotion dysregulation. Further analyses supported emotion dysregulation as a mediator of the association between SCT and social impairment. Conclusion: These findings are important for theoretical models of SCT and underscore the need for additional, longitudinal research.”

Reference

Flannery, A.J. (April 1, 2014). Does Emotion Dysregulation Mediate the Association Between Sluggish Cognitive Tempo and College Students' Social Impairment? Journal of Attention Disorders. DOI: 10.1177/1087054714527794.

More on Exercise and AD/HD

“Based on these 3 articles, we concluded that 30 min of physical exercise reportedly improved the executive functions of children with ADHD. Due to the small number of articles selected, further studies are needed to confirm these benefits.”

Grassmann, V., et al. (March 12, 2014). Possible Cognitive Benefits of Acute Physical Exercise in Children With ADHD A Systematic Review. Journal of Attention Disorders. DOI: 1087054714526041.abstract.

Cognitive Performance of Adults with AD/HD and Comorbid PTSD

“Differences emerged between control participants and participants with ADHD on multiple neuropsychological tests. Across all tests, control participants outperformed participants with ADHD. Differences between the two ADHD groups emerged on seven psychological subtests including multiple Wechsler Adult Intelligence Scale—Third edition and Rey-Osterrieth Complex Figure Test measures. These test differences did not account for self-reported quality of life differences between groups. **Conclusion:** The comorbidity with PTSD in adults with ADHD is associated with weaker cognitive performance on several tasks that appear related to spatial/perceptual abilities and fluency. Neuropsychological test performances may share variance with the quality of life variables yet are not mediators of the quality of life ratings.”

Reference

Antshel, K.M., et al (February 24, 2014). The Neuropsychological Profile of Comorbid Post-Traumatic Stress Disorder in Adult ADHD Journal of Attention Disorders. DOI: 1087054714522512.abstract.

Computerized Working Memory Training In College Students with AD/HD

“Intent-to-treat analysis revealed that participants receiving WM training showed significantly greater improvements on the criterion WM measures and self-reported fewer ADHD symptoms and cognitive failures. The follow-up assessment indicated that gains in WM were maintained, as were improvements in cognitive failures. Conclusion: Computerized WM training is a feasible and possibly viable approach for enhancing WM in college students with ADHD or LD.”

Gropper, R.J., et al. (January 13, 2014). Working Memory Training in College Students With ADHD or LD
[Journal of Attention Disorders](https://doi.org/10.1080/10870547.2014.881649). DOI: 1087054713516490.abstract.

AD/HD & Antisocial Personality Disorder

“There is an increased risk for children with ADHD with or without comorbid CD to develop later onset of antisocial personality disorder.”

Storebo, O.J., et al. (November 27, 2013). The Association Between ADHD and Antisocial Personality Disorder (ASPD): A Review. Journal of Attention Disorders. DOI: 1087054713512150.

AD/HD and Cerebellar Motor Symptoms

“Children with ADHD had significantly more cerebellar symptoms compared with the TD (typically developing, sic.) children. Cerebellar symptom scores decreased with age in the ADHD group; in the TD group remained stable. In both groups, cerebellar symptoms were associated with parent-rated hyperactive/impulsive symptoms, variability of response time standard error (RT-SE) and increase of RT-SE as the test progresses. More variables were associated with cerebellar symptoms in the ADHD group including omission errors, overall RT-SE and its increase for prolonged interstimulus intervals. Conclusion: Our results highlight the importance of research into motor functions in children with ADHD and indicate a role for cerebellar impairment in this disorder.”

Reference

Goetz, M., et al. (January 10, 2014). Cerebellar Symptoms Are Associated With Omission Errors and Variability of Response Time in Children With ADHD. Journal of Attention Disorders. DOI: 1087054713517745

COGMED Review

“We conclude that Cogmed has the potential to help individuals improve working memory capabilities and focused attention. Conclusion: More research is needed to demonstrate if these changes in working memory and focused attention are enduring and generalizable.”

Roche, J.D., et al. (March 6, 2013). Cogmed Working Memory Training Product Review. Journal of Attention Disorders. DOI: 1087054714524275