

## Relationship of quantitative DTI abnormalities in the temporal lobes and language functioning in autism

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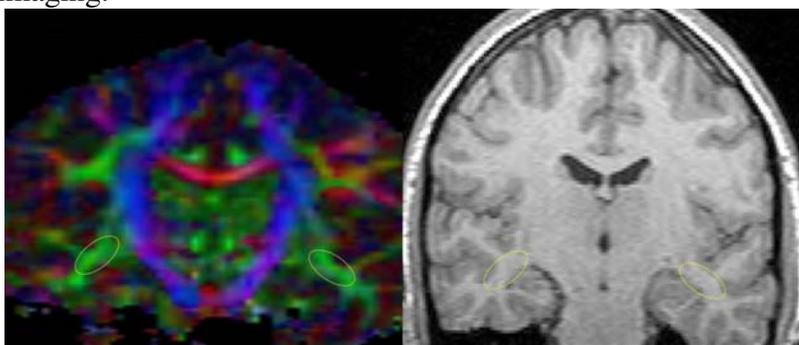
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**Purpose:** To examine the relationship of Diffusion Tensor Imaging (DTI) in the left and right temporal areas with the communication domain of the Vineland Adaptive Behavior Scale (VABS), a measure of language skill, in an autistic population compared with matched normal controls.

**Materials and Methods:** Subjects included 5 right-handed, verbally-able male adolescents aged 15-18 years with autism and average or greater IQ and 5 typically-developing male adolescents matched on age, handedness, and IQ. DTI was performed on a Philips 1.5T Intera [Best, Netherlands] using 15-direction diffusion-encoding, with  $b=0$  and  $b1=860 \text{ s/mm}^2$ . Three-dimensional fiber tracking was performed using Philips software and apparent diffusion coefficient (ADC) measurements developed from regions of interest placed within the temporal white matter (figure 1). In addition, 3D volumetric data was acquired and left and right temporal lobe white and gray matter measures were performed using Analyze 6.0.

**Results:** No significant group differences were apparent on left or right temporal white or gray matter volume using MANOVA controlling for total intracranial volume. However, a paired t-test indicated a significant group difference on ADC in the right temporal lobe ( $t_4 = 3.211$ ,  $p = 0.024$ ), with autistic adolescents exhibiting higher ADC—a measure of increased diffusion or altered white matter structure. There was also a trend indicating a similar relation in the left temporal area for ADC ( $t_4 = 2.202$ ,  $p = 0.093$ ). A strong correlation existed for the difference scores between pairs on left temporal ADC and difference scores between pairs for the communication domain on the VABS ( $r = -0.953$ ,  $p = 0.012$ ) again reflecting a relationship where higher ADC was associated with lower communication ability.

**Conclusion:** Using DTI measurements in conjunction with volumetrics, there is an apparent association between higher ADC indicative of altered white matter and decreased verbal skills in our autistic population compared to normal controls. Further investigation using DTI in subjects with autistic spectrum disorders may provide valuable insights into brain-behavior relationships not demonstrable by conventional magnetic resonance imaging.



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