



# WIRING THE BRAIN MAKING CONNECTIONS

INTERNATIONAL CONFERENCE  
APRIL 12TH-15TH 2011  
POWERSCOURT, CO. WICKLOW, IRELAND

## P2.14 Diffusion Imaging In Individuals with Partial Deletions of The Williams Syndrome Critical Region

Stefano Marenco<sup>1</sup>, Dharshan Chandramohan<sup>1</sup>, Matthew Geramita<sup>1</sup>, Lindsay Walker<sup>2</sup>, Roe Katherine<sup>6</sup>, Shane Kippenhan<sup>6</sup>, Aarthi Padmanabhan<sup>6</sup>, Phillip Kohn<sup>6</sup>, Carolyn B. Mervis<sup>3</sup>, Ariel M. Pani<sup>4</sup>, Colleen A. Morris<sup>5</sup>, Daniel R. Weinberger<sup>1</sup>, Carlo Pierpaoli<sup>2</sup>, Karen F. Berman<sup>6</sup>

<sup>1</sup>Unit for Multimodal Imaging Genetics, Clinical Brain Disorders Branch, NIMH-IRP, Bethesda, MD, USA, <sup>2</sup>Section on Tissue Biophysics and Biomimetics, NICHD-IRP, Bethesda, MD, USA, <sup>3</sup>Neurodevelopmental Sciences Lab, University of Louisville, Louisville, KY, USA, <sup>4</sup>Dept. of Biochemistry and Molecular Biology, University of Louisville, Louisville, KY, USA, <sup>5</sup>Genetics Division, Dept of Pediatrics, University of Nevada School of Medicine, Las Vegas, NV, USA, <sup>6</sup>Section on Integrative Imaging, Clinical Brain Disorders Branch, NIMH-IRP, Bethesda, MD, USA

### Introduction:

Prior Diffusion Tensor Imaging (DTI) studies have established that Williams Syndrome (WS, caused by the hemizygous microdeletion of ~25 genes on chromosome 7q11.23) is associated with altered white matter (WM) integrity. Studying individuals with partial deletions (PD) in the WS region could provide insight into the role of a smaller set of genes within the WS critical region.

### Methods:

Eleven individuals with varying PDs at 7q11.23, including and telomeric to the elastin (ELN) and LIM domain Kinase 1 (LIMK1) genes, participated in this study. Eleven healthy individuals matched for age, IQ and gender served as the control group.

Diffusion Weighted Images were acquired on a GE Signa 1.5T Scanner (2x2x2 mm resolution, 120 gradient directions, max. b-value=1200 sec/mm<sup>2</sup>), and were corrected for head movement and eddy currents using TORTOISE (<http://science.nichd.nih.gov/confluence/>).

Fractional anisotropy (FA) maps were calculated and registered in a common space with Tract Based Spatial Statistics (TBSS: <http://www.fmrib.ox.ac.uk/fsl/>). Nonparametric statistical tests were performed using FSL's randomise procedure with 2000 permutations, using threshold free cluster enhancement for correction of multiple comparisons.

### Results:

We observed a significant reduction of FA in PD individuals relative to controls throughout the brain ( $p < 0.01$ ), with the peak of significance in the left internal capsule ( $p = 0.0005$ ).

### Conclusion:

Our results suggest that the hemideletion of LIMK1 and ELN, the only deletions common to our entire PD group, is associated with alterations in WM integrity in WS. More work is necessary to understand the impact of LIMK1 and nearby genes on WM structure as measured by DTI.