

The Effects of HIV and Aging Using Diffusion Tensor Imaging

H. Peng¹, J. Mettenburg², A. Snyder¹, D. Clifford¹, T. Benzinger², and B. Ances¹

¹Neurology, Washington University in St. Louis, St. Louis, MO, United States, ²Radiology, Washington University in St. Louis, St. Louis, MO, United States

Introduction

Chronic infection with HIV is associated with neuroinflammation (1). Prior diffusion tensor imaging (DTI) studies have demonstrated increased mean diffusion (MD) and decreased fractional anisotropy (FA) in the corpus callosum of HIV+ patients (2, 3). This study investigated if HIV led to accelerated aging using DTI.

Methods

DTI measures of fractional anisotropy (FA), mean diffusivity (MD), radial diffusivity (RD), and axial diffusivity (AD) were obtained on a 3T Siemens scanner for HIV younger (20-25 years old) (n=8), HIV- older (50-65 years old) (n=12), HIV+ younger (20-25 years old) (n=9), and HIV+ older (50-65 years old) (n=9) subjects. HIV status was characterized by CD4 cell count and plasma viral load. DTI indices were mapped to a common whole brain white matter skeleton for between-subject voxelwise analysis using Tract-Based Spatial Statistics (TBSS) (4). The corpus callosum was divided into thirds corresponding to the genu, middle, and splenium based on previous studies (5) (Figure 1). An analysis of variance was utilized to assess for possible differences in DTI measures in these three regions for the various groups. Subsequent t- tests were performed with Bonferroni correction applied.

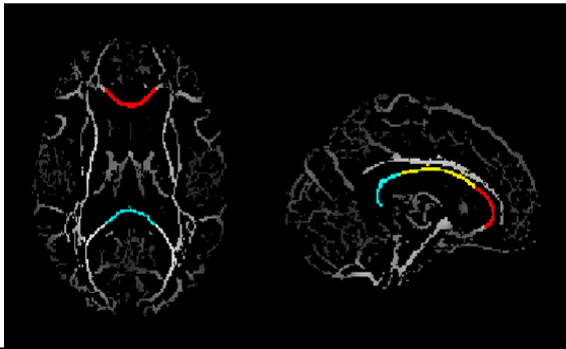


Figure 1. The corpus callosum was divided into thirds (genu (red) middle (yellow) and splenium (blue)).

Results

Aging led to a significant reduction in MD, AD, RD in HIV- subjects but not HIV+ subjects (Figure 2). FA values were similar for all groups for the various regions. While HIV infection did lead to a reduction in MD, AD, and RD values, this decrease was not significant. There was no statistically significant correlation was found between DTI values and CD4 cell counts or plasma viral load.

Conclusions

Aging leads to a significant decrease in DTI parameters. These changes are mitigated in HIV suggesting a complex interaction is present in HIV+ older subjects. In particular, decreases in DTI due to normal aging are compensated by increases in DTI measures due to HIV.

References

1. Ances B and Ellis R (2007) *Semin Neurol.* 27:86-92.
2. Thurner M. et al. (2005) *AJNR.* 26: 2275-81.
3. Wu Y et al. (2006) *AJNR.* 27: 656-60
4. Stricker Ret al (2009) *Neuroimage,* 45(1):10-16.

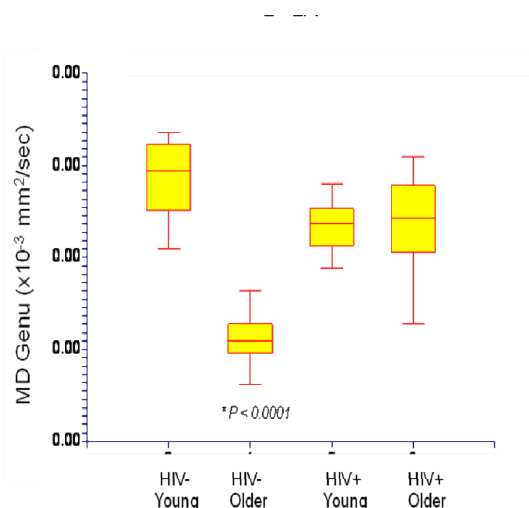


Figure 2. Aging but not HIV serostatus led to a significant reduction in MD in the genu.