Damionne C. Bell
BIORETS Program, New Orleans Charter Science and Math High School, New Orleans, Louisiana

Drs. Deidre J. Devier and Shannin N. Moody
Departments of Cell Biology & Anatomy and Neurology, LSU Health Sciences Center, New Orleans, LA

High Levels of Cortisol in Hair and Demyelination in African American Women with Multiple Sclerosis

Background: Nearly one million people in the United States (Nelson et al, 2019) are diagnosed with Multiple Sclerosis (MS), a neurodegenerative disorder characterized by the breaking down of myelin on neuronal axons that may results in lesions and brain atrophy which are also associated with stress (Ward & Goldman, 2022). Black women (BW) with MS show disparities in disease epidemiology when compared to other racial groups and have higher indicators of biopsychosocial stressors, including cortisol a biological measure of stress.

Objectives: This research investigates the association between hair cumulative cortisol (HCC) and measures atrophy in the brain in black women (BW) and white women (WW) women with MS to address how stress may impact brain atrophy differently in these groups.

Methods: HCC was assays from hair samples collected from the parietal region of the scalp. MRIs were reviewed to measurement the right ventricle, frontal horn, and bicaudate. Demographic data was reported by all participants. Pearson's correlations were run for cortisol, frontal horn, bicaudate, and third ventricle size. Independent T-tests were then run to examine differences between BW and WW in age, education, Multiple Sclerosis Severity Scores, Expanded Disability Status Scale, and Cortisol. Finally, we tested whether HCC was differently associated with brain atrophy as measured by the frontal horn and if the relationship was impacted by race. A subset of participants had all measures. Sample sizes vary in different analyses.

Results: There was a positive relationship between cortisol and frontal horn width r (31) = .45, p < .01, 95% CI [.12, .69]. T-tests showed a significant difference between BW and WW in frontal horn width, t(59) = 3.14, p < .01 (BW M = 28.80, SD = 2.77; WW M = 31.51, SD = 3.53), and bicaudate width, t(59) = 3.65, p < .01 (BW M = 14.02, SD = 2.45; WW M = 17.84, SD = 4.62).

BW also differed significantly from WW in age, t(84) = 3.84, p < .01 (BW M = 40.05, SD = 11.55; WW M = 49.20, SD = 10.55), and years of education, t(83) = 2.46, p = .02 (BW M = 13.65, SD = 2.34; WW M = 15.04, SD = 2.84).

Linear regression showed that the overall model predicting frontal horn width from age, education, MSSS, cortisol, and race was significant, R = .61, R^2 = .37, adjusted R^2 = .24, F(5, 25) = 2.95, p = .03. HCC was significantly associated frontal horn width, B = 1.35, SE = 0.45, β = .49, t = 3.00, p < .01, such that higher HCC was associated with greater frontal horn width. Race was also significantly associated frontal horn width, B = -3.16, SE = 1.48, t = -2.13, p = .04, such that BW had smaller frontal horn width than WW even after controlling for age, education, MSSS, HCC.

Conclusion: The findings revealed a direct correlation between HCC and brain atrophy as measured by the front horn and bicaudate width. While BW had less atrophy, across all women

higher level of HCC were associated with more brain atrophy in the frontal horn. This showed that race, and HCC play meaningful roles in brain atrophy for our sample.