Hair cortisol in maltreated children and adolescents: Importance of developmental period and maltreatment characteristics

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**Background:** Cortisol in scalp hair, an index of long-term cumulative cortisol secretion, is deemed a promising tool for under- standing the enduring impact of maltreatment on mental health. We conducted a comprehensive investigation of hair cortisol concentrations (HCC) in relation to caregiver maltreatment and child mental health in a large, carefully characterized child and adolescent sample.

**Method:** We recruited 537 children and adolescents (3 to 16 years; 272 females) with maltreatment (n = 245) or without mal- treatment histories (n=292). Maltreated subjects were recruited from child protection services (CPS; n = 95), youth psychiatric services (n=56), and the general population (n=94). Maltreatment characteristics (subtypes, severity, chronicity, timing) and child mental health were ascertained from caregiver reports and CPS records. HCC was determined in the first 3 cm hair segment.

**Results:** Analyses uniformly supported that maltreatment experiences coincide with a gradual and dose-dependent attenuation of HCC beginning between 9 and 10 years. This pattern emerged consistently from both group-comparisons between maltreated and non-maltreated subjects (27.56% HCC reduction in maltreated 9–16-year-olds) and dimensional analyses within maltreated subjects, with lower HCC related to greater maltreatment chronicity (r=−.237, p=.008) and number of subtypes (r=−.315, p<.001). Likewise, we found evidence both across maltreated and non- maltreated groups and within the maltreated subjects, that HCC attenuation partially mediates the influence of maltreatment on externalizing symptoms.

**Conclusions:** Beginning in late childhood, maltreatment, with increasing exposure, results in down-regulation of long-term cortisol secretion which, in turn, predisposes to externalizing symptoms.