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Altered energetics in the postnatal developing brain consequent to secondhand smoke exposure

Postnatal exposure to secondhand smoke (SHS) is linked with increased behavioral and cognitive problems and risk for mental disorders in children. Many among us consider SHS a think of the poast; however, the latest figures show that nearly one in five U.S. children still live with a smoker and 98% tested positive for exposure. Children exhibit the highest exposure, and 50% of mothers who quit during pregnancy resume in under six months. Given continued prevalence of children's exposure to SHS, it is important to understand the biological mechanisms underlying neurodevelopmental consequences. Here we report that modeled postnatal exposure results in altered mitochondrial energetics with correlates to altered neuronal activity in a relevant region of the brain, the cerebellum. Clinical effects of SHS in children, to include inattention, hyperactivity, language issues, conspicuously all involve regulated by the cerebellum. We performed a large-scale, quantitative proteomic assessment of the cerebellum in response to postnatal SHS exposure. Findings, as substantiated by focused immunochemical and microscopic studies, demonstrated a significant increase in mitochondrial biogenesis and aerobic activity. We have further evidence correlating these findings with altered neuronal activity rather than cellular stress mechanisms. Ultimately, these findings support a direct biological effect of SHS exposure during the vulnerable period of cerebellar developing that may prove associated with neurodevelopmental consequences in a large at risk population of children worldwide.

Biography

Andrew Ottens is an Assistant Professor of Anatomy & Neurobiology and Biochemistry at Virginia Commonwealth University. He completed his Ph.D. studies at the University of Florida and post doctoral research at the McKnight Brain Institute. He is an expert in brain insults, employing systems biology to investigate perturbation at the proteomic, cellular and functional levels.