

Elizabeth R. Sowell, Ph.D.
Director, UCLA Developmental Cognitive Neuroimaging Laboratory

Professor of Pediatrics, USC/CHLA

Imaging the Developing Human Brain and the Impact of Prenatal Exposure to Drugs of Abuse

During development, the human brain sacrifices plasticity for the sake of speed and efficiency. Underutilized synaptic connections are pruned away during childhood and adolescence, reducing plasticity, as myelination insulates highly used connections increasing speed of transduction between interconnected brain systems. Brain imaging technology has advanced in the last 2 decades allowing us to map trajectories of change in the human brain in vivo, and we and others have observed patterns of cortical thinning and white matter development in spatial and temporal patterns that likely reflect the trajectory of change in cognitive domains through out childhood and adolescence. Understanding more about typical brain development can lead to more accurate interpretations of alterations in the biological processes that result from teratogenic exposures in utero. The use of methamphetamine (MA) by young adults is a major problem in the United States, and its use by pregnant women continues. Many women who use MA during pregnancy also use alcohol, a known teratogen which can result in fetal alcohol syndrome (FAS) and a broad spectrum of disorders, making it difficult to determine the specificity of various drug exposures on subsequent cognitive, behavioral, and neuroanatomical abnormalities. Here, I will discuss recent findings on developmental changes in brain structure, brain activation, and neurocognitive functioning in typically developing children and adolescents, and the abnormalities associated with prenatal exposure to drugs of abuse. It is important to understand that the developmental path is malleable and influenced by genetic, hormonal, behavioral or environmental factors: understanding these relationships may lead to more effective interventions or treatments in individuals with disorders resulting from prenatal exposure to drugs of abuse.