Fetal cannabinoid receptors and the “dis-joint-ed” brain

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To make their study relevant to a condition potentially occurring in marijuana smoking pregnant mothers, Tortoriello and colleagues assessed the distribution and density of SCG10 mRNA in the primordial hippocampus and parahippocampal gyrus of electively aborted second-trimester human fetuses exposed prenatally to cannabis vs. age-matched controls. They found that, also in the human developing brain, SCG10 mRNA levels were significantly reduced in cannabis-exposed subjects during the temporal window coincident with the formation of intra- and extracortical axonal trajectories (Kostovic & Judas, 2010). Indeed, retrospective longitudinal studies have documented potential long-term behavioral abnormalities in marijuana-exposed offspring—including exaggerated startle response and poor habituation to novel stimuli in infants, hyperactivity, inattention, and cognitive retardation in adolescents (Fried et al., 2002; Huizink & Mulder, 2006). Experimental studies substantiate these observations and link behavioral and cognitive deficits and emotional responsiveness to pharmacological interference with endocannabinoid signals during fetal development (Passey et al., 2014; Shabani et al., 2014). Increased incidence of schizophrenia, depression, and predisposition to substance abuse in offspring prenatally exposed to cannabis (Substance Abuse and Mental Health Service Administration, 2012) might also be due, in part, to CB1-induced altered developmental synaptic organization, which, even when remaining latent for long periods, might be prone to failure if challenged by environmental cues.

In conclusion, the important findings by Tortoriello et al. provide a mechanistic explanation as to why marijuana abuse should be avoided during pregnancy. Future investigations should address the effect of THC on axon targeting processes in neonates and developing pups, thus allowing us to understand whether or not these observations are relevant also to the ever-increasing use of cannabidiol-enriched, but still THC-containing, cannabis extracts for pediatric indications, such as epilepsy (Porter & Jacobson, 2013).

Conflict of interest

Vincenzo Di Marzo is a consultant for GW Pharmaceuticals, UK, and receives research funds from the same company. The other author, Luigia Cristina, declares that she has no conflict of interest.

References