

Animal models of postnatal stress in neuropsychiatric disorders

F.R. D'Amato

Cell Biology and Neurobiology Institute, CNR

Early life events are known to have a great impact on the developing organisms and epigenetic modifications have been suggested to influence or 'program' gene expression that may or may not be heritable. Prenatal, postnatal, and early developmental determinants such as stress experience, infections, maternal diet and behavior represent environmental factors that may have long-term effects affecting neurodevelopmental disease predisposition. Maternal separation during the first days of life represents the most common form of postnatal stress animal models have been exposed. Mice and rats have been isolated or simply separated from the mother for sessions of different duration and the brief and long-term behavioral and neurochemical effects of these manipulations were analyzed. Several factors associated to maternal separation contribute to make these manipulations unpleasant for pups that tend to stay close to their caretakers: cold, absence of tactile and olfactory familiar cues stimulation and starvation. Maternal behavior represents an additional variable that may affect the impact of separation on pups' development. Additional care by the mother, as well as maltreatment or neglect, may have long-term effects on pups' development. The behavioral and hypothalamus-pituitary-adrenal (HPA) axis response to stress of these animals can be still affected at adulthood and may, together with genetic predisposition, affect the development of neuropsychiatric disorders. However, alterations of the HPA axis functionality are not always associated to adult psychopathologies. Rather than exposing mouse pups to separation from the mother, we have recently developed a different protocol of early aversive condition, based on the instability of the maternal environment. Briefly, pups were exposed to repeated cross-fostering procedure (RCF) during the first 4 days of life, in order to prevent the formation of the attachment bond with the mother. This procedure was developed to simulate a malfunctioning of attachment behavior that in humans can result in separation anxiety disorder (SAD). SAD has been associated to both panic disorder (PD) and depression in humans and our experiments suggest that RCF mice could represent a valuable model for PD and for motivational deficits as those observed in depressed patients.