EDITORIAL

A Genomic and Epigenomic Approach for Studying Neuropsychiatric Disorders Associated to Early-life Stress: Part II

As anticipated in the editorial of the Part I of this special issue, Early Life Stress (ELS) profoundly impairs child's brain development and behavior giving rise to either temporary or permanent effects on cognitive, behavioral and psychological functions. Furthermore, possible long-term cumulative effects of various types of early adversity may show up in adulthood [1]. ELS-related pathological consequences greatly vary among individuals and depend upon genetic and environmental factors. This second part of the issue includes four additional reviews and provides novel exciting aspects linking genomics and epigenomics to neuropsychiatric disorders associated to Early-Life Stress. A natural extension of this second part of the thematic issue is the double-edged sword of epigenetic processes: their potential reversibility and long-term stability *via* non-Mendelian inheritance mechanisms. A growing amount of evidence has showed that our DNA remembers past traumatic experiences through the storage of epigenetic marks that can be transmitted into subsequent generations. Epigenetic alterations may cause a variety of latent biological dysfunctions in the stress system of the offspring and result as pre-traumatic vulnerable factors [2, 3]. These novel and exciting mechanisms of trans-generational inheritance suggest the possibility to deliver integrative solutions in the clinical diagnosis and therapeutic approach against various long-term consequences to ELS, and in later family life. Based on these observations, the paper by Lux highlights the role of a parallel synaptic and hormonal activation of epigenetic programming in human and rodent models. Liu *et al.* elucidate both genomic and non-genomic mechanisms related to stress modulation of the hypothalamic-pituitary-adrenal (HPA) axis leading to methylation of the glucocorticoid receptor gene (NR3C1) and activation of lifelong impairments. Bearer *et al.* provide an in-depth introduction to genome-wide changes in the child's methylome pattern induced by early adversity in life, potentially linked to the development and function of brain circuits, immune and endocrine system. Stenz *et al.* describe the still largely unexplored concept of the intergenerational transmission of DNA methylation signatures associated to the increased risk for developmental psychopathology. The aforementioned reviews are mostly focused on genomic and epigenomic variations in neuropsychiatric disorders associated to ELS phenomena. Moving these advanced findings into the routine medical practice will offer a revolutionary care and rehabilitation approach for patients, either adults or children generally poorly managed, who suffer from psychopathologies following ELS exposure. The overall aim of this Special Issue is to prove how the developmental age may represent a window of opportunity to implement novel early interventions in the diagnosis and treatment of individuals subjected to ELS. Likewise, the resulting collection of the present reviews examines wider strategic significance. A greater understanding of neuroplasticity and the brain interactions with the social environment will promote a fertile ground of investigations to the pathogenesis of neurodegenerative disorders and other psychiatric illnesses (*e.g.* schizophrenia), characterized by disruptive processes of cerebral growth and synaptic plasticity [4, 5].

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Xena Giada Pappalardo

Guest Editor

Institute of Neurological Sciences
Italian National Research Council
Via Paolo Gaifami, 18
95125 Catania
Italy
E-mail: xenapappalardo@gmail.com

Sebastiano Cavallaro

Guest Editor

Institute of Neurological Sciences
Italian National Research Council
Via Paolo Gaifami, 18
95125 Catania
Italy
Tel: +39-095-7338128000
Fax: +39-095-7338110
E-mail: sebastiano.cavallaro@cnr.it