Preventive Therapy of Mental Disorders

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Introduction

According to the World Health Organization, 1 in every 4 people develops a mental disorder. However, despite the huge efforts in the field, our knowledge about the basic mechanisms of mental disorders is still limited. Although psychiatric medications have been widely prescribed for the past decade, the low efficacy of the treatments, the lack of new validated targets or absence of robust animal models are some critical factors among the others that point out to the urgent need to create a new "culture for accelerating" translational medicine [1].

Accumulating evidence indicates that mental disorders are neurodevelopmental by its origin when changes are happening prenatally or in early postnatal life with delayed onset of behavioural symptoms [2]. It means we need to detect psychopathology like schizophrenia as early as possible and precise defining the prodrome with full characterization of genetic/epigenetic, biochemical, cellular, brain and behavioural alterations is a high priority for the current research [3,4]. The major aims in the direction of preventive medicine of mental disorders are 1) to find robust biomarkers of prodromal stages of mental disorders before the symptoms are fully blown up; 2) to find the right type of treatments; and 3) the right time for the medications.

Modern diagnostic technologies, mainly based on cognitive alterations that precede psychosis, can identify nearly 1/3 of adolescents on their move towards the psychosis [5]. However, early-life treatments with antipsychotics have been mainly disappointing [6] and hence, it opens a possibility to create a new, more effective preventive medicine. Notably, that behavioural therapy, e.g. training that sharpens the executive functioning in case of schizophrenia [6], long-term memories in case of patients with Alzheimer's disorder (AD) [7], early intensive behavioural interventions in case of people with autism [8] and social behavioural therapy in case of patients with major depression [9] improves symptoms even more effectively than drug medication. This fact provides the evidence that brain is plastic and approaches based on neuronal plasticity and neurotechnologies may appear as a main strategy for preventive medicine in the near future.

The neurodevelopmental disorders include a large group of disorders that share the main feature-delayed onset of disease during the ongoing maturation and development. These illnesses are often characterized by intellectual disability, specific learning disabilities, attention deficit hyperactivity disorder, autism, epilepsy etc. Neurodevelopment mental disorders are caused by multiple genetic and environmental factors. In this special issue on "Preventive Therapy of Mental Disorders" we focus on preventive medicine of schizophrenia, autism and AD in aging people, based on human and animal studies. Some progress has been achieved by monitoring multiple biochemical markers associated with autism spectrum disorder, including e.g. oxidative stress, decreased methylation ability, reduced synthesis of glutathione, impaired function of mitochondria, immune dysregulation [10]. The usage of full battery of biomarkers will help to identify the best one in young children with autism because at that age children cannot fully and adequately describe their symptoms. Follow up steps will translate the acquired knowledge into development of new treatments of autism [11]. Accumulating data from epidemiological, clinical, preclinical studies as reviewed by Brown and Derkits indicate that exposure to infection highly contributes to the etiology of schizophrenia. Animal models of maternal immune activation discovered intriguing resemblance of behavioural, neurochemical, and neurobiological impairments with those in patients with schizophrenia [12-15]. Therefore, based on the key role of inflammation in schizophrenia, it was suggested that anti-inflammatory compounds might be a novel preventive treatments against the schizophrenia [16]. On the other hand, in order to resolve the controversial issue that antipsychotics have not been successful in prevention of schizophrenia, Leucht et al. [17] precisely estimated associations between drug treatments and various outcomes in human with schizophrenia. AD is the most common cause of dementia in the aging population characterized by memory loss and cognitive decline. Currently, there is no effective strategy to prevent onset of AD and its progression. The increasing evidence suggests that accumulation of amyloid-β protein plays a major role in AD pathophysiology. Importantly, that neuroinflammation mediated by the brain innate immune system, significantly contributes to AD pathology and exacerbate the progression of the disease. In a good agreement with this approach, the inhibition of microglia protected hippocampal neurogenesis and reversed cognitive deficits in a mouse model [18]. On this note, specific antibodies have been developed for immunotherapy of AD [19] as a promising direction to prevent this mental disorder.

The new era of preventive medicine in psychopharmacology is just begun and we are in front of new discoveries, which will be translated from the animal studies to the clinic to correct brain development in the right time with the right compound.

References


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