and (v) pleiotropic events leading to unexpected therapeutic outcomes. The understanding of these mechanisms is the main focus of pharmacoepigenomics, in order to optimize therapeutics and advance towards personalized medicine.[16,207]

In the coming years, important achievements must be accomplished in different areas of neuroscience: (i) brain development and maturation; (ii) toxicogenomics; (iii) functional epigenomics; (iv) proteoepigenomics; (v) pathoepigenomics; (vi) predictive proteomics; (vii) diagnostic proteomics; (viii) prognostic proteomics; (ix) pharmacoepigenomics; and (x) epitherapeutics. It is likely that systems biology will dominate the biology and medicine of the 21st century.[208] Relevant information obtained from the ENCODE Project will be incorporated into a more versatile map of clinical neuroscience and practical medicine.[209–211] Development is a dynamic process that involves interplay between genes and the environment. Postnatal environment is shaped by parent–offspring interactions that promote growth and survival and can lead to divergent developmental trajectories with implications for later-life neurobiological and behavioral characteristics.[212] The impact that nutrition, emotions, drugs and environmental toxicants during prenatal development may have on brain maturation and late CNS disorders requires urgent clarification.[213–215] Important advances related to the role of epigenetics in the pathogenesis of brain disorders will occur in the near future with reliable applications. Predictive, diagnostic, and prognostic proteomics, as well as the use of biomarkers to monitor the effects of drugs, will undergo a profound change from the present immature stage of the field to a more specific and validated area with various applications in CNS disorders.

In therapeutics, important breakthroughs will occur in some of the following areas: (i) drug discovery for different CNS disorders, age-related NDDs and cancer;[15,16,170,216,217] (ii) practical applications of pharmacogenomics[11,23] and pharmacoepigenomics[176–179,218] for the optimization and personalization of current drugs and new biopharmaceuticals; (iii) novel therapeutic approaches to decode and resolve potential resistance mechanisms in cancer, psychiatric disorders, and NDDs;[179,218–221] and (iv) targeting miRNAs in the prevention and treatment of brain disorders.[222–224]

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