

Human brain proteome in health and disease.

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The most challenging yet intriguing tissue still to be understood is that which drives all aspects of mankind: the brain. There is no other tissue that is as dynamic and influential in the human body than the brain. This is so much so that there are major initiatives especially by government and federal agencies to develop technologies to understand this tissue. For example, the National Institutes of Health has increased funding for its recent Brain Research through Advancing Innovative Neurotechnologies® (BRAIN) Initiative in order to promote research to further our understanding of brain.

Given the importance of the brain for the normal functioning of the human body, alterations in brain molecular signaling can lead to devastating diseases and conditions. Neurodegenerative disorders cover a broad spectrum of diseases affected by changes in the central nervous system, such as Alzheimer's disease, Parkinson's disease, Down's syndrome, and Amyotrophic lateral sclerosis. These disorders also include conditions that result from sporadic events such as traumatic brain injury as well as psychiatric disorders such as depression and schizophrenia, which emerge from genetic and environmental causes.

Much progress has been made in recent years to determine genes, proteins, metabolites, and other molecules and cells especially altered in brain and associated diseases. These advances have led to gain some understanding of disease pathogenesis and have shown us how complex the brain and its signaling are in health and disease. Nevertheless, the more we start to uncover about this tissue the more we realize we are only touching the surface of our understanding and more work needs to be done.

Thus, this special issue brings you current advances in research related to brain in health and disease within the context of the proteome. Our aim of breaking down the complexity of human brain is often realized with the use of animal models ranging from mice to zebrafish and in human tissues that are rich in brain proteins such as cerebrospinal fluid and plasma. Proteomics lends us insight into biological pathways and key proteins altered in health and disease and often requires the detection of post-translationally modified proteins such as oxidatively-modified and glycosylated proteins.

We hope that through this combination of reviews and research articles on various diseases related to brain that you gain new insights to complexities of the brain proteome and learn of new areas for ongoing and future efforts. Brain is a highly dynamic organ and undoubtedly requires a dynamic cast of researchers to uncover important aspects of health and disease.