STRESS, NEURONAL PLASTICITY & VULNERABILITY TO MENTAL ILLNESS

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There is growing evidence that psychiatric disorders are characterized by the dysfunction of selected neurotransmitter systems, as well as by a general reduction in neuronal plasticity that contributes to deficits in cell-cell communication. Since stress represents a major element for the vulnerability to mental illness, it might be hypothesized that exposure to adverse life experiences can alter the expression of an array of proteins important for cell function and resiliency. A series of experiments conducted in our laboratory have demonstrated that stressful events early in life determine anatomically-selective and persistent changes in the expression of brain derived neurotrophic factor (BDNF), an important player in neuroplasticity. Acute and chronic stress can also be used in adulthood in order to evaluate coping ability under challenging conditions, as well as to reproduce a paradigm that is detrimental for brain function. To this end, we found that the modulation of neuroplastic genes and signalling pathways after acute stress is influenced by developmental experiences as well as by the genetic background. Conversely prolonged stress determines profound reduction of the expression and signaling of neurotrophic molecules in selected brain regions of the adult brain. Interestingly pharmacological treatment with psychotropic drugs may counteract these defects by boosting neuronal plasticity. As an example antidepressants enhance BDNF transcription, but also modulate the sorting of the neurotrophin in selected cellular compartments. These data suggest that the characterization of stress-induced alterations might be relevant for the development of novel and more effective drugs for the cure of psychiatric diseases.