



Molecular Neurobiology Services Section Home

History

The roots of molecular neurobiology can be traced back to the 20th century when researchers began integrating molecular biology techniques with neuroscience. The elucidation of the DNA structure in 1953 by Watson and Crick laid the foundation for understanding genetic information in the nervous system. The discovery of neurotransmitters like acetylcholine and serotonin in the mid-20th century marked a turning point in understanding neuronal communication at the molecular level.

Eric Kandel

His pioneering work on synaptic plasticity and memory storage earned him the Nobel Prize, highlighting the molecular basis of learning and memory.

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Paul Greengard

Greengard's research on signal transduction in the nervous system provided insights into neuronal communication and led to the discovery of protein kinases.

Gene Expression Profiling

The advent of microarrays and next-generation sequencing enabled the study of gene expression patterns in different brain regions.

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Neurotransmitter Receptors

Molecular biology has unraveled the structure and function of various neurotransmitter receptors, shedding light on neuronal communication.

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Industrial Applications

1.

Neurodegenerative Diseases

It contributes to understanding the molecular mechanisms underlying diseases like Alzheimer s, Parkinson s, and ALS.

3.

Neuropharmacology

It guides the development of drugs that target specific neurotransmitter receptors and signaling pathways.

5.

Neuroinflammation

Molecular studies provide insights into the molecular basis of neuroinflammatory processes and their role in neurological disorders.

7.

Neurodevelopment

Molecular neurobiology uncovers the molecular cues that guide neural development and circuit formation.

9.

Neurotrophic Factors

Molecular neurobiology explores the roles of growth factors in neural survival, differentiation, and regeneration.

11.

Neuromodulation

Molecular studies shed light on neuromodulators effects on neuronal activity and behavior.

13.

Neuroimmunology

It delves into the molecular interplay between the nervous and immune systems in health and disease.

15.

Neurotransmitter Transporters

It investigates the molecular mechanisms underlying neurotransmitter reuptake and transport.

17.

Neuroinformatics

It utilizes computational approaches to analyze complex neural data and model brain function.

19.

Neuroendocrinology

It explores the molecular interactions between the nervous and endocrine systems.

Precision Medicine

Molecular neurobiology will enable personalized treatment strategies based on an individual's genetic and molecular profile.

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Neuropharmacogenomics

The field will guide the development of drugs tailored to an individual's genetic makeup.

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Neural Regeneration

Molecular insights will aid in developing regenerative therapies for spinal cord injuries and neurodegenerative diseases.

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Neuroimmunotherapy

Molecular studies will lead to innovative therapies that modulate neuroinflammatory processes for neurological disorders.

Molecular neurobiology stands as a testament to the profound impact of merging neuroscience and molecular biology. From unraveling the intricacies of neural circuits to decoding the molecular basis of brain disorders, this field has transformed our understanding of the brain's complexity. With advances in technology and interdisciplinary collaboration, the future of molecular neurobiology holds the promise of unraveling the brain's mysteries, paving the way for innovative therapies, enhanced diagnostics, and a deeper appreciation of the neural symphony that underlies human cognition and behavior.