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Parasympathetic Nervous System (PNS)

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Without Abstract

Definition

The parasympathetic nervous system (PNS) is one of two main branches or subsystems of the autonomic nervous system (ANS). It originates in the brain stem and sacral spinal cord and commonly – but not always – yields peripheral adjustments that are complementary to those produced by its counterpart, the sympathetic nervous system (SNS).

Description

The parasympathetic nervous system is one of two main branches or subsystems of the autonomic nervous system, the physical system responsible for nonconsciously maintaining bodily homeostasis and coordinating bodily responses. Working with the second main branch, the sympathetic nervous system, the parasympathetic nervous system regulates a wide range of functions such as blood circulation, body temperature, respiration, and digestion. Parasympathetic activation commonly leads to adjustments on organs and glands that are complementary to those produced by sympathetic activation and suitable for low activity and bodily restoration ("rest and digest" as opposed to "fight and flight"). Examples of low activity and restorative adjustments are constriction of blood vessels in the lungs, increased gastric secretion, and decreased heart rate and contraction force. Although parasympathetic adjustments tend to complement sympathetic adjustments, they do not always. For example, both parasympathetic nervous system arousal and sympathetic nervous system arousal increase salivary flow, although to different degrees and

yielding different compositions of saliva.

Basic functional units of the parasympathetic nervous system are preganglionic and postganglionic neurons. Preganglionic neurons have cell bodies in the brainstem or sacral spinal cord and axons that extend to cell bodies of postganglionic neurons. Postganglionic neurons have cell bodies that are clustered in so-called ganglia and relatively short axons that innervate target organs and glands.

The major neurotransmitter of the parasympathetic nervous system is acetylcholine. It is the neurotransmitter of all preganglionic and postganglionic neurons. Stimulation of the cholinergic receptors of the nicotinergic subtype located on the cell bodies of the postganglionic neurons by acetylcholine leads to an opening of nonspecific ion channels. This opening permits the transfer of potassium and sodium ions, which depolarizes the postganglionic cell and initiates an action potential in the postganglionic cells. Muscarinic cholinergic receptors are located on target organs and glands. Stimulation of muscarinic receptors by acetylcholine activates G-proteins, which trigger the effector response via a second-messenger pathway. Specific effects depend on the innervated visceral structure. For instance, activation of the muscarinic receptors of the heart muscle leads to reduced heart rate and heart contraction force. Stimulation of muscarinic receptors of the salivary glands increases salivary flow.

In working jointly with the sympathetic nervous system, the parasympathetic nervous system does not function in an all-or-none fashion, but rather activates to different degrees. Depending on the affected visceral structure and situation, it may be more or less active than the sympathetic nervous system. Shifts in the magnitude of sympathetic and parasympathetic influence can occur locally within a single visceral structure (e.g., the eye) or across visceral structures, with local shifts occurring to meet highly specialized demands (e.g., a change in ambient light) and global shifts adapting the body to large-scale environmental changes (e.g., the appearance of a substantial physical threat). Autonomic control is maintained by structures in the central nervous system that receive visceral information from an afferent (incoming) nervous system. A key central nervous system structure is the hypothalamus, which integrates autonomic, somatic, and endocrine responses that accompany different organism states.

Cross-References

Acetylcholine

Adrenaline

Autonomic Activation

Autonomic Balance

Autonomic Nervous System (ANS)

Epinephrine

Sympathetic Nervous System (SNS)

References and Readings

Berne, R. M., Levy, M. N., Koeppen, B. M., & Stanton, B. A. (2004). *Physiology* (5th ed.). St. Louis, MO: Mosby.

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Levick, J. R. (2009). *An introduction to cardiovascular physiology* (5th ed.). London: Hodder.

Cross-References

▶ Panic Attack

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American Psychiatric Association. (2000). *Diagnostic and statistical manual for mental disorders* (Revised 4th ed.). Washington, DC: Author.
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Paradoxal Sleep

▶ REM Sleep

Parallel Group Design

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Synonyms

Independent treatments group design

Definition

A parallel group design is an experimental study design in which each subject is randomized to one of two or more distinct treatment/intervention groups. Those who are assigned to the same treatment are referred to as a treatment group.

While the treatments that these groups receive differ, all groups are treated as equally as possible in all other regards, and they complete the same procedures during the study. This parallel activity on the part of the groups of individuals is captured in the term "parallel group design."

The term controlled study is often heard in this context. One group will receive the treatment of interest and another group a control treatment, against which responses during and at the end of the treatment intervention are compared. Going one step further, the term concurrently controlled study makes clear that the different groups take part in their respective treatment arms at the same time. If all of the subjects in one treatment group completed their participation first, and then all of the other subjects completed their participation at some later time, it is quite possible that other factors could confound the results.

Cross-References

▶ Crossover Design
▶ Randomization

Parasympathetic

▶ Autonomic Balance
▶ Heart Rate Variability

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Cross-References

- ▶ Acetylcholine
- ▶ Adrenaline
- ▶ Autonomic Activation
- ▶ Autonomic Balance

- ▶ Autonomic Nervous System (ANS)
- ▶ Epinephrine
- ▶ Sympathetic Nervous System (SNS)

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Paraventricular Nucleus

- ▶ Hypothalamus

Parent-Child Concordance

- ▶ Family Aggregation

Parent-Rated Life Orientation Test of Children (P-LOT)

- ▶ Optimism and Pessimism: Measurement

Parietal

- ▶ Brain, Cortex

Parkinson's Disease

- ▶ Parkinson's Disease: Psychosocial Aspects

Parkinson's Disease: Psychosocial Aspects

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Synonyms

Degenerative parkinsonism; Parkinsonism; Parkinson's disease; PD; Secondary parkinsonism

Definition

Parkinson's disease (PD) is the second most common neurodegenerative disorder and is characterized by motoric symptoms of resting tremor, rigidity, bradykinesia, and gait disturbance. The psychosocial aspects of PD involve the interaction of PD symptomatology, psychological development and function, personal relationships, and environmental factors.

Description

Parkinson's disease (PD) is a common neurodegenerative disorder that affects approximately between 500,000 and a million Americans of all races and ethnic groups, and 0.3% (5 million) of the world's population. Pathologically, PD is an inexorably progressive disorder of unknown cause in which neurons of the substantia nigra progressively degenerate resulting in greater degrees of brain dopamine deficiency. In addition, a number of other neuronal pathways degenerate including cholinergic, noradrenergic, and serotonergic pathways. Primary motor manifestations of PD include resting tremor, bradykinesia (e.g., slowed motor ability), rigidity, and gait disturbance. Important clinical features to establish the diagnosis of PD include