

Neuroendocrinology: A guide for undergraduate education

BSN

● British Society for
Neuroendocrinology

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What is neuroendocrinology?

Neuroendocrinology is the study of how the nervous and hormonal systems interact to regulate the function of processes in the body.

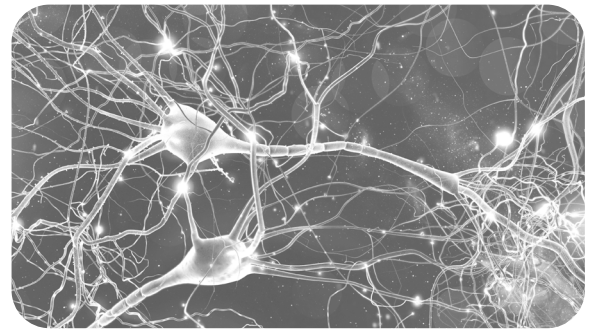
Research in neuroendocrinology aims to develop methods to beneficially regulate neuroendocrine function in humans and animals in the normal and diseased state.

Transferrable skills: Targets

- Understanding of the principles behind good experimental design and data communication
- Awareness of the relative advantages of different preclinical research models and clinical trials
- An appreciation of the ethical considerations in scientific research
- Ability to synthesise primary research literature
- Critical thinking and evaluation
- Clear scientific writing

Related fields

- Neuroscience
- Endocrinology
- Physiology
- Pharmacology
- Pathology
- Genetics
- Developmental biology
- Ecology
- Zoology
- Agriculture
- Animal behaviour



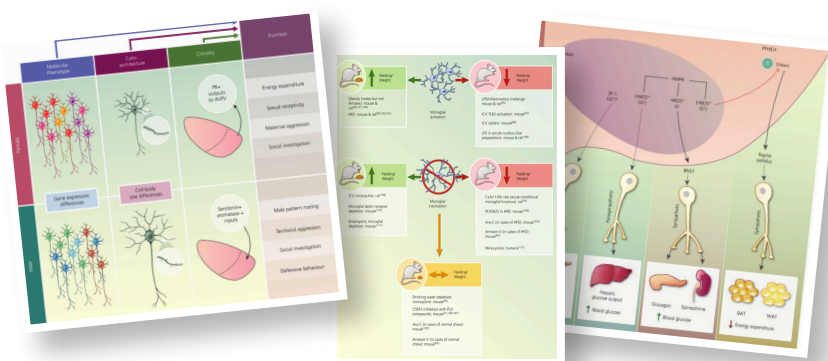
Free tools and resources

**British Society for
Neuroendocrinology:
Topical Briefings**
neuroendo.org.uk

**Journal of Neuroendocrinology:
Professional illustrations gallery**
[onlinelibrary.wiley.com/
journal/13652826/homepage/
resource-gallery](http://onlinelibrary.wiley.com/journal/13652826/homepage/resource-gallery)

**Society for Neuroscience:
videos and resources**
BrainFacts.org

**National Neuroscience
Curriculum Initiative**
Nncionline.org



More information

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Image DOI references L-R:
10.1111/jne.12801; 10.1111/jne.12838; 10.1111/ne.12773

Key Concepts in neuroendocrinology

Molecular basis of hormone secretion and action in the CNS

- Pharmacological targets of hormone action in the CNS and PNS
- Endocrine regulation of neuronal & glial signalling
- Neuroendocrine regulation of hormone synthesis and release, including positive & negative feedback
- Neurophysiology of neuroendocrine and neurosecretory cells
- Mechanisms of hormone insensitivity and resistance

Functional anatomy of neuroendocrine systems

- Structure & function of neurosecretory and neuroendocrine cells
- Anatomy of neuroendocrine structures: hypothalamus, circumventricular organs, pituitary gland and pineal gland
- Mechanisms of hormone entry into the CNS
- Peripheral target organs in neuroendocrine feedback loops

Neuroendocrinology and society

- Common diseases and disorders associated with altered neuroendocrine function
- Impact of the environment and society on neuroendocrine systems and related behaviours
- Conservation and differences in neuroendocrine systems across species
- Neuroendocrine regulation of social behaviour and cognition

Biological timekeeping

- CNS regulation of pulsatile (ultradian), daily (circadian) and annual (seasonal) rhythms
- Integration of information from internal & external cues in the regulation of biological rhythms
- Molecular mechanisms underlying biological timekeeping
- Interface between biological timekeeping and other neuroendocrine axes

Energy and fluid homeostasis

- CNS temperature, nutrient, sodium and water sensing mechanisms
- Hormonal regulation of neural systems controlling: metabolism, body temperature, hunger, thirst and osmolarity
- Communication between peripheral organs and the CNS to regulate energy and fluid homeostasis
- Interactions between neuroendocrine & autonomic pathways

Reproduction

- Neuroendocrine regulation of reproductive transitions: puberty and menopause
- Neuroendocrine regulation of ovarian cyclicity and gamete production
- Neuroendocrine regulation of pregnancy and lactation
- Hormonal regulation of sexual behaviour and parental nurture
- Neuroendocrine basis of sex & gender

Growth and development

- Development of neuroendocrine systems
- Neuroendocrine regulation of growth: Growth hormone axis and insulin-like growth factor
- Neuroendocrine regulation of the skeleton
- Neuroendocrine influence on the *in utero* environment
- Thyroid hormone axis

Stress

- Neuroendocrine response to physiological, psychological and environmental stressors: Hypothalamic-pituitary-adrenal axis and sympathetic nervous system
- Systemic influence of stress on neuroendocrine and wider physiological functions
- Neural stress response circuits

Acronyms

CNS - Central Nervous System | PNS - Peripheral Nervous System