

Doctoral School: **Biology Doctoral School**
Doctoral Program: Neuroscience and Human Biology

Subject code: **BIO/7/44**

Subject title: **Neuropeptides L**

Teacher and Neptun code: **Dr. Tóth Attila (BFJNBX)**

Credits: 4

Class hours: 2 hours/week, lecture

Aim of the course

The aim of the lecture is to provide a general presentation of peptide transmitters and their research possibilities, and then to describe in detail the neuropeptides that play an important role in various physiological and pathological functions, including possible medical aspects.

Course content

1. General characterization of neuropeptides and their signaling I. (receptors, synthesis, processing, release, elimination, relationship with other mediators)
2. General characterization of neuropeptides and their signaling II. (receptors, synthesis, processing, release, elimination, relationship with other mediators)
3. General characterization of neuropeptides and their signaling III. (receptors, synthesis, processing, release, elimination, relationship with other mediators)
4. Possibilities of studying the function of neuropeptides (transgenic models, optogenetics, siRNA, pharmacology, pharmacogenetics, behavioral tests).
5. Role of neuropeptides in sleep regulation and circadian rhythms (basal forebrain peptidergic mechanisms, human models, role of peptides in REM sleep, role of hypothalamic peptides, peptides in the suprachiasmatic nucleus).
6. Role of neuropeptides in food intake and energy homeostasis (orexigenic and anorexigenic peptidergic cells in the nucleus arcuatus, POMC, melanocortins, leptin, ghrelin, nesfatin, GALP, orexin, pregnancy / lactation hyperphagia)
7. The role of neuropeptides in central cardiovascular regulation and respiratory regulation (neuropeptides of brainstem centers, neuropeptides released from vegetative nerves)
8. Role of neuropeptides in thermoregulation and pain (pain-sensing pathways and spinal cord organization focusing on peptides and their receptors, opioid peptides, antiopioid peptides, peptidergic mechanisms of thermoregulation, fever, starvation)
9. The role of neuropeptides in the regulation of sexual functions (GnRH and kisspeptin neurons, circadian and seasonal timing, effect of metabolic status on reproductive functions)
10. Role of neuropeptides in stress / anxiety / depression (role of CRF in HPA axis overactivity, role of neuropeptide S in the amygdala, role of oxytocin, somatostatin, opioid receptors)
11. Role of neuropeptides in reward and addiction (models of addiction, allostasis, reward and anti-reward systems, peptidergic mechanisms in amygdala / extended amygdala, role of NPY and opioid peptides in alcohol dependence)
12. Role of neuropeptides in learning and memory processes (role of dynorphin, nociceptin and galanin in hippocampal and cortical memory processes)
13. Therapeutic possibilities with neuropeptides I. (peptides and blood-brain barrier, peptides in the cerebrospinal fluid, limitations and possibilities of peptidergic medicine)
14. Therapeutic options with neuropeptides II. (peptides and the blood-brain barrier, peptides in the cerebrospinal fluid, limitations and possibilities of peptidergic medicine)

Requirements

written exam

Literature

lecture slides available, ca. 500 slides

