

CoPGr CURRICULAR CHAMBER

SUBJECTS PRESENTATION FORM

SUBJECT'S ACRONYM: **RNP5767**

SUBJECT'S NAME: Molecular Aspects of Synaptic Release

CURRICULUM/AREA: Neurology/17140

FOCAL AREA: Neurosciences

INITIAL VALIDITY (Year/Semester):

N. OF CREDITS: 05

Theoretical Classes: 02 Practical Classes, Seminars and Others: 08 Hours of Study: 05

DURATION IN WEEKS: 05

PROFESSOR(S) IN CHARGE:

USP Professor, n. 1097498 – Jorge Eduardo Moreira

ACTUAL COSTS OF THE SUBJECT: BRL

(Presenting, if applicable, the budget foreseen for the year, as an attachment)

PROGRAM

OBJECTIVES:

Introducing current and classic basic concepts on the operation of the nervous system. Reading and study of the synapse knowledge evolution and the methodologies employed on the acquisition of such knowledge in a structural, molecular and electrophysical level.

JUSTIFICATION:

Retrospectively looking to the technological advances since the beginning of the 19th Century, it seems that our current understanding of the nervous system was reached in two great steps. The first one is originated from the application of physics knowledges, mainly the works on electricity which were the foundation for the electrophysics description of the neurons (studies of the nervous conduction). The second step of knowledge started with the fusion of electrophysiology and molecular biology.

The brain function depends on the control of the levels or on the resulting interaction of the receptors from the most different neurotransmitters known and which participate on the regulation of the synaptic transmission process (communication). These receptors have been investigated due to their potential role related to the control of the neural plasticity development, to the awakening state, the sleep-wake cycle, and in the most different manifestations of neuropsychiatric conditions, such as "search for news" behaviors, attention deficit disorders and hyperactivity, anxiety, depression, affective disorder, schizophrenia, obsessive compulsive disorder, alcohol dependence, nervous anorexia and recovery after traumatic brain lesion, Parkinson disease, ischemia and epilepsy.

Questions related to the nature and mechanisms that characterize the chemical communication between neurons, called synaptic transmission, have been studied mainly in the last 30 years. Most of the success reached in the knowledge of this area is due to studies of the "Loligo pealii" squid's giant synapse. These studies were useful for defining the process in space and time. The time level is measured in fractions of milliseconds and the space level in nanometers.

The chemical synaptic transmission involves two different neural specializations, the pre- and post-synaptic compartments. The neurotransmitter release from its intracellular site happens from the pre-synaptic terminal and the answer to the this neurotransmitter happens in post-synaptic structures, at the other side of the synaptic split.

The post-synaptic receptors to the neurotransmitters are characterized until the molecular level of their sub-units' composition.

During the course we will seek information, or create hypotheses on questions so intricate among them that it will be difficult to clearly separate them. These questions are referent to: 1 - neurotransmitters release mechanisms; 2 - role of calcium in these processes; and 3 - role of the chemical modulators in the neurotransmitters transport.

The main problem is understanding the mechanisms that regulate the transformation of an electric signal, the action potential of a nerve, in the secretion process which leads to the synaptic transmission. For such, the coordinated work of morphologists, cell and molecular biologists, pharmacologists and eletrophysiologists is necessary.

CONTENT (SYLLABUS):

Concepts on the synapse operation will be analyzed under the following subjects sequence:

- 1 - Integrative properties of mammals' and invertebrates' nervous system.
- 2 - Molecular composition of the synapse's active zone.
- 3 - Ionic mechanisms responsible by the synaptic transmission.
- 4 - Structural and functional variations of the synapse under molecular changes experimentally introduced.

The course will consist on theoretical classes and discussion seminars performed by the students with a moderator assigned based on the recent literature.

EVALUATION METHOD:

- 1 - Students participation in the moderation and seminars discussion.
- 2 - Presentation of discussion with bibliographic review of the topics presented to be locally published in Portuguese for the use of the undergraduate and graduate courses.

NOTES: