Lecture Series "Riron": B5 Human brain functional Science **Subject Code 20060**

(Elective: 2 credits)

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【Objectives】

A highly complex structure, human brain has been developed from simple central nervous system (CNS) that detects environmental information and use the information directly for its body response. Human brain achieved memory, cognition, spirit and identity in its structure by increasing number of neurons and number of subtypes of neurons. In this lecture series, **'Human brain functional Science',** we will try to show you how mental activity appear from 'gene expression', neuron electrical activity, information convergence and divergence in the neuronal circuit. We will inspect hypotheses proposed on the mechanisms to produce brain function. Finally we will speculate the intrinsic brain mechanisms by using mental disorders as clues.

【Content Description】

We will show you and discuss with you on the points: molecular mechanisms of induction of neural plate and regionalization. Molecular mechanisms of differentiation and process of morphogenesis will be shown into detail. You will learn how environmental information is conveyed to human brain region and used for information processing and cognition. You will also learn neuronal basis for mental activity.

【Keywords】

Aminergic neuron, Neocortex, Brain stem, Neural induction, regionalization, neuroepithelium, neural differentiation, action potential, synaptic transmission, neurotransmitter, plasticity in synapses

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

【Office Hour】

If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】

Grading will be based on active class participation, paper summaries, and the final report.

【**Lecture Schedule**】 Please also refer to the timetable shown in the Section 5.

The sessions marked with "e" are under preparation of e-learning contents. In some cases, the session that is not marked with "e" will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions.

There are six types of e-learning, those marked with "eE0", "eEL", "eJ0", "eJL", "eEJ-0"and "eEJ-L". To know the meanings of these six markings and to learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time		Instructors	Topics
1.	eJ-L Jun 9 (Tue)	6th period	Kenji Shimamura	Neural induction
2.	Jun 16(Tue)	6th period	Kenji Shimamura	Regionalization of brain
3.	Jun 23 (Tue)	5th period	Kenji Shimamura	Morphogenesis in individual region
4.	eE-O Jun 30(Tue) eJ-O	5th period	Nobuaki Tamamaki	Structure of neurons
5.	Jul 7 (Tue)	5th period	Wen-Jie Song	Action potential
6.	eJ-L Jul 14 (Tue)	5th period	Wen-Jie Song	Synapse and synaptic transmission
7.	eJ-L Jul 21 (Tue)	5th period	Wen-Jie Song	Neurotransmitter
8.	Jul 28 (Tue)	5th period	Manabu Ikeda	Multiple approaches to mental disorder
9.	**eE-L** Aug 4 (Tue) **eJ-L**	5th period	Nobuaki Tamamaki	Modulation of neural activity by amine
10.	**eE-O** Aug 18 (Tue) **eJ-O**	5th period	Nobuaki Tamamaki	Neuronal network in the neocortex
11.	**eE-O** Aug 25 (Tue) **eJ-O**	5th period	Nobuaki Tamamaki	Mental activity raised from circuit mechanisms
12.	eJ-L Sep 1 (Tue)	5th period	Wen-Jie Song	Plasticity in synapses
13.	Sep 8(Tue)	5th period	Noboru Fujise	Neurotransmitter and mental symptom
14.	Sep 15 (Tue)	5th period	Manabu Ikeda	Neural basis of mental disorder
15.	~~Sep 29 (Tue)~~	~~5th period~~	~~Manabu Ikeda~~	~~Neural basis of dementia~~ (No Lecture)

【Reference】

2) Classification of e-learning

Please note that the lectures by e-learning are classified into 6 types: eE-O, eE-L, eJ-O, eJ-L, eEJ-O and eEJ-L.

1. Classified according to the language used in the lecture.
   - eE: e-learning content in English
   - eJ: e-learning content in Japanese
   - eEJ: e-learning content in both Japanese and English

2. Classification according to the use of e-learning for the lecture.
   - -O: Lecture only by e-learning; no face-to-face class will be conducted.
   - -L: In principle, a face-to-face lecture; if unable to attend the lecture, a student may participate in the lecture through e-learning as supplementary lecture.

3. Regarding a lecture with e-learning content prepared only in Japanese (eJ-O or eJ-L), if an international student, who cannot understand Japanese, has registered for such lecture, the face-to-face lecture will be conducted in English (+ Japanese). This lecture may be recorded to be used for an e-learning content as eE or eEJ in future.

4. Example of e-learning classification:
   eJ-L means "students are requested to attend the face-to-face lecture in principle, but if unable to do so, they can participate in the e-learning lecture prepared in Japanese language as supplementary lecture". If an international student, who cannot understand Japanese, has registered for the course, a face-to-face lecture will be conducted in English (+Japanese).