February 4, 2013

Lab 1 due today

Lab 2 Results due Thursday

Extra credit opportunities this week!
1) Weds, 4:00 to 6:00 PM, or any part of this time. Nerve 3 demo in the Mudd Hall atrium for the NB&B open house.

Extra credit opportunities next week!
1) Weds, Thurs, Friday: 1:30 to 3:30- Help lead Nerve 3 recordings for a BME class.

Week 2 lab report:

Short scientific paper (brief communications)

Brief Abstract:

Very short Introduction: 2 paragraphs

Brief Methods from lab handout (can refer to lab handout for details)

Results: Present your data with good text descriptions of figures

Discussion: Answer lab reports question in a narrative, rather than just a list of answers

Introduction to Sensory Physiology:
Sensory-Motor System

General Properties of Sensory Systems??????

Developing Central Cortex, gold dye, and Feulgen on dehydrated panel, 36" x 72" Greg Dunn, 2012.
General Properties of Sensory Systems

1. Importance of peripheral structures
2. Adequate Stimulus
3. Range Fractionation
4. Stimulus-Response Relationship
5. Adaptation
6. Efferent Control
7. Higher level processing for perception (what you “see” is not what you get- Illusions!)

Crustacean muscle receptor organs

MROS in parallel with superficial extensors

Device to control muscle length with variable loads
Works like our muscle spindles

See Bylqvist et al 2007

Figure 10.2. Dissection. A. Remove the tail from the crayfish. B. Remove the ventral surface of the tail. C. Scrape out all the muscles ventral to the gut. Ventral is up in B and C.
Example Recording from Crawdad


MRO1 response

MRO1 data analysis

This data set contains an upregulation of transcripts in the rat hippocampus. Selecting "rate" from the "seal mission" display in the lower events analysis panel illustrates the rate of adoption of this specific memory sequence.

MRO1 data analysis


Compare tau adaptation at different stretches

Anatomy of MROs

Extensor muscles, especially note RM1 and RM2

Muscle remaining in tail segment

MRO innervation- excitatory mns and inhibition of sensory cell
Mechanisms of Adaptation:
1) Series-elastic properties of muscle
2) MRO1 - slow adaptation - $I_{K(Ca)}$, Na/K pump
3) MRO1 and MRO2 have similar generator potentials
4) MRO2 adapts more quickly to depolarization faster INa inactivation
Control system summary of MRO activity

Set point can vary

Response to stretch

Generator (receptor) potential

Linear relationship between generator potential amplitude and impulse frequency

Na entry dominates response

Excitatory conductance increase

I = g (Em - E ion)

Na+ + TTX
Inhibitory, efferent control of MRO

\[ I = g (E_m - E_{ion}) \]

Mechanisms of inhibition?
Reduce AP generation by:
1) Algebraic summation of excitation and inhibition
2) Reduction of space constant

Summary of MRO
Rydqvist, et al. 2007