

Brain Cooling Device

Client

Dr. Ugo Faraguna

Team Members

Jay Sekhon(Leader)

David Leinweber(BSAC)

Jon Seaton(Communicator)

Mark Reagan(BWIG)

Progress Report 3

February 20 to February 25, 2009

Problem Statement:

Sleep is homeostatically regulated; the more we are awake, the more and more intensively we need to sleep afterward. Despite this common notion, the mechanisms underlying the homeostatic regulation of sleep are still unknown. One key question pertains to which brain activities during waking are relevant for the subsequent homeostatic increase in sleep intensity. In parallel, one could argue what is relevant for the homeostatic decline of sleep intensity across the night. In other words what are the mechanisms underlying the idea that the more we sleep, the less we need to sleep. One option is that just the passage of time is relevant for both aspects of the homeostatic process regardless of any specific brain activity. Another option is that specific activities inducing neuronal or metabolic changes during waking are reflected during subsequent sleep. To distinguish these possibilities, an intriguing approach consists of selectively silencing neural activity in brain areas important for the sleep-wake cycle regulation; in particular of locally and reversibly silencing patches of cerebral cortex (where the homeostatic process most likely occurs). The specific aim of the project consists of developing a miniature cooling device able to reversibly silence neural activity in spatially defined brain areas of freely moving rodents.

Last Week's Goals

- Finish the design matrix so that designs can be evaluated
- Begin outlining components of mid-semester report
- Continue vortex tube testing for proof-of-concept

Summary of Accomplishments

- Set up times to continue testing this weekend as well as complete the goals from last week that did not get completed

This Week's Goals

- Outline Mid-Semester Report and begin writing
- Continue vortex tube testing
- Complete design matrix and begin design evaluation

Individual Goals

- Mark: Outline schematics and begin investigating necessary components for phase change cooling.
- Jay: Wrote weekly progress report. Looked into phase change cooling setups.
- David: Looked for methods of getting a better test on the vortex tube.
- Jon: Looked for better testing methods on the vortex tube.

Project Difficulties

This was a particularly rough week to get times together to meet with conflicting schedules and midterms, so not much got accomplished.

Activities

- 2-20-09: Project meeting with Dr. Tyler
- 2-26-09: Jay wrote progress report.

Expenses

Task	January		February				March				April				May	
Papers	23	30	6	13	20	27	6	13	20	27	3	10	17	24	1	8
PDS	X	x	x		x	x	x									
MidSemester Progress Reports				x	x	x	x									
Final Report	X	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
											x	x	x	x	x	x
Prototype																
Preliminary Design	X	x	x													
Actual Design			x	x	x											
Order Parts				x	x	x										
Build					x	x	x	x								
Presentations																
MidSemester End						x	x					x	x	x	x	
Meetings																
Dr. Tyler	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Client	x		x		x		x		x		x		x		x	