

Form Approved Through 09/03/2007

OMB No. 0925-001

Grant Number

5R01EY17077-3

Total Project Period

From: 01/01/2006

To: 11/30/2009

EIN:

[Redacted]

Review Group:

ZRG1 IFCN-A (91) M

Requested Budget Period:

From: 12/01/2007

To: 11/30/2008

Title of Project:

Neurophysiological effects of training in visual cognitive tasks

Due Date: 10/16/2007

Submitted Date: 10/03/2007

Principal Investigator:

CHRISTOS CONSTANTINIDIS
WAKE FOREST UNIV HEALTH SCIENCES
NEUROBIOLOGY AND ANATOMY
MEDICAL CENTER BLVD
WINSTON-SALEM , NC 27157

Applicant Organization:

WAKE FOREST UNIVERSITY HEALTH SCIENCES
WAKE FOREST UNIVERSITY HEALTH SCIENCES
MEDICAL CENTER BLVD
WINSTON-SALEM , NC 27157

Phone Number: (336) 716-7424

Fax Number: (336) 716-4534

Email Address: CCONSTAN@WFUBMC.EDU

Department: NEUROBIOLOGY AND ANATOMY

Major Subdivision: SCHOOL OF MEDICINE

Administrative Official:

Paula M Means
Office of Research
Grants Administration
Medical Center Blvd.
Winston-Salem , NC 27157

Signing Official:

Kim Yates
Medical Center Boulevard
Winston-Salem , NC 27157

Phone Number: 336-716-0780

Fax Number: 336-716-4480

Email Address: nihawards@wfubmc.edu

Phone Number: 336-716-0780

Fax Number: 336-716-4480

Email Address: koyates@wfubmc.edu

Human Subjects: No Yes

Research Exempt: No Yes

Exemption No: FWA Number: FWA00001435

Full IRB: No Yes

Phase III Clinical Trial: No Yes

Program Income: No Yes

Vertebrate Animals: No Yes

Animal Assurance Number: A3391-01

Inventions and Patents: No Yes

Previously Reported

Not Previously Reported

<u>Budget Period</u>	<u>Anticipated Amount</u>	<u>Source</u>
F&A Changes:		
Performance Sites:		
WAKE FOREST UNIVERSITY HEALTH SCIENCES WAKE FOREST UNIVERSITY HEALTH SCIENCES MEDICAL CENTER BLVD WINSTON-SALEM NC 27157	WAKE FOREST UNIVERSITY HEALTH SCIENCES WAKE FOREST UNIVERSITY HEALTH SCIENCES MEDICAL CENTER BLVD WINSTON-SALEM NC 27157	

Principal Investigator: CHRISTOS CONSTANTINIDIS	Grant Number 5R01EY17077-3
Applicant Organization: WAKE FOREST UNIVERSITY HEALTH SCIENCES	Period Covered by this Report: 12/01/2006 - 11/30/2007
Title of Project: Neurophysiological effects of training in visual cognitive tasks	
SNAP Questions:	
<p>Has there been a change in the other support of key personnel since the last reporting period?</p> <p><input type="checkbox"/> No <input checked="" type="checkbox"/> Yes</p> <p>Justification: The Co-Investigator reports minor changes in the level of support from other grants.</p>	
<p>Will there be, in the next budget period, a significant change in the level of effort for the PI or other personnel designated on the Notice of Grant Award from what was approved for this project?</p> <p><input checked="" type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Justification:</p>	
<p>Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total budget?</p> <p><input checked="" type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Justification:</p>	
<p>Changes in Select Agent Research? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Changes in Multiple PI Leadership plan? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes</p>	
Human Subject Education Requirement:	
<p>Has the Involvement of Human Subjects changed since previous submission? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Has the Involvement of Animal Subjects changed since previous submission? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes</p>	
Publications:	
<u>Citation ID:</u>	<u>Citation Text:</u>



Research Accomplishments:

File is not uploaded

Other Document File:

File is not uploaded

Personnel Report	
Principal Investigator: CHRISTOS CONSTANTINIDIS	Grant Number 5R01EY17077-3

Name:	Degree(s) Name:	SSN:	Role on Project:	Months Devoted to Project		
				Cal	Acad	Sum
CHRISTOS CONSTANTINIDIS	PHD		PI	9.6		
Terrence Stanford	Ph.D.		Co-Investigator	1.8		

Principal Investigator/Program Director (Last, First, Middle): Constantinidis, Christos

GRANT NUMBER
5R01EY17077-3

PROGRESS REPORT SUMMARY

PRINCIPAL INVESTIGATOR OR PROGRAM DIRECTOR

Christos Constantinidis

PERIOD COVERED BY THIS REPORT

FROM

12/01/2006

THROUGH

11/30/2007

APPLICANT ORGANIZATION

Wake Forest University Health Sciences

TITLE OF PROJECT (Repeat title shown in Item 1 on first page)

Neurophysiological effects of training in visual cognitive tasks

A. Human Subjects (Complete Item 6 on the Face Page)

Involvement of Human Subjects

No Change Since Previous Submission

Change

B. Vertebrate Animals (Complete Item 7 on the Face Page)

Use of Vertebrate Animals

No Change Since Previous Submission

Change

C. Select Agent Research

No Change Since Previous Submission

Change

D. Multiple PI Leadership Plan

No Change Since Previous Submission

Change

SEE PHS 2590 INSTRUCTIONS.

WOMEN AND MINORITY INCLUSION: See PHS 398 Instructions. Use Inclusion Enrollment Report Format Page and, if necessary, Targeted/Planned Enrollment Format Page.

-There has been only a minor change in other support of key personnel since the last reporting period: effort of co-investigator Stanford devoted to other projects has increased from %.

-There will be no significant change in the level of effort for the key personnel for the upcoming period.

-An unobligated balance greater than 25 percent of the current year's total budget is not anticipated.

A. Specific Aims

Research is pursuing the specific aims specified in the original grant application.

B. Studies and Results

The project is using a non-human primate model to determine how the prefrontal cortex encodes information prior to training in a cognitive task, and how learning shapes neuronal activity and circuitry. During the current budget period (second year of the grant) substantial progress has been made towards the grant objectives. Specific Aim #1 of the application, to determine whether neuronal activity automatically encodes locations and features of sensory stimuli in naïve animals, is essentially complete. Neurophysiological recordings were obtained from four monkeys naïve to any training in cognitive tasks, while they were passively viewing visual stimuli. The results indicated that a population of prefrontal neurons automatically encodes the locations of visual stimuli and activity persists after the offset of the stimuli, as in animals trained to maintain these stimuli in memory. Furthermore, a clear difference was observed in terms of the dorsal and ventral subdivision in terms of their selectivity, predominantly for spatial and feature stimuli, respectively. Additionally, results were obtained addressing Specific Aim #2. Neurophysiological recordings were repeated in one of the monkeys, after it was trained to perform a working memory task requiring memory of both spatial location and feature of stimuli. The results indicate that selectivity for spatial locations and features in the prefrontal cortex does not change dramatically after training in the task, even though the monkey is now required to recognize and remember the stimuli. The dichotomy in functional selectivity of dorsal and ventral subdivisions was present after training; we observed no appreciable increase in feature selectivity in the dorsal prefrontal cortex and in spatial selectivity in the ventral prefrontal cortex.

C. Significance

Our findings run counter to the established view that training in a working memory task can lead to plastic changes in prefrontal activity and selectivity. If the results of Specific Aim #2 are verified in additional animals, we believe they will call for a re-evaluation of views about prefrontal cortical organization and function.

D. Plans

During the next year of support, we expect to complete training and collect data from at least two more monkeys and essentially complete Specific Aim #2. These experiments will also provide the database of neuronal recordings necessary to address the analysis goals of Aim #3.

E. Publications

Peer-reviewed, journal articles:

1. T. Meyer, X. L. Qi and C. Constantinidis (2007). Persistent discharges in the prefrontal cortex of monkeys naïve to working memory tasks. *Cerebral Cortex*, 17: i70-76.

http://cercor.oxfordjournals.org/cgi/content/abstract/17/suppl_1/i70

Conference abstracts:

1. T. Meyer, X. Qi, T. R. Stanford, C. Constantinidis. Functional organization of monkey prefrontal cortex prior to training in a memory task. Program No. 548.22, 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online

<http://www.abstractsonline.com/viewer/viewAbstract.asp?CKey={65716742-8C67-4D99-8D5D-1FA32652C0CD}&SKey={FE9FC83A-3E1B-47B7-B961-01DE174B1698}&MKey={D1974E76-28AF-4C1C-8AE8-4F73B56247A7}&AKey={3A7DC0B9-D787-44AA-BD08-FA7BB2FE9004}>

2. A. Barborica, C. Constantinidis. Non-Euclidean metric in template matching algorithm enhances spike discrimination. Program No. 491.10, 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online

<http://www.abstractsonline.com/viewer/viewAbstract.asp?CKey={869A853D-E3F4-4018-AB83-93DAB55716E5}&MKey={D1974E76-28AF-4C1C-8AE8-4F73B56247A7}&AKey={3A7DC0B9-D787-44AA-BD08-FA7BB2FE9004}&SKey={6C92F18E-6539-489E-B590-C8C760412FCB}>

**PHS 398/2590 OTHER SUPPORT
1 R01 EY017077-03**

CONSTANTINIDIS, C.

ACTIVE

----- (Constantinidis) 7/1/04 – 6/15/08 (NCE) 1.2 cal.

\$66,000

“The role of the prefrontal cortex in memory and higher cognitive functions”

The project uses an animal model to investigate the biological basis of memory and cognitive functions. The knowledge gained from these experiments will provide insights in the biological basis of higher cognitive functions and the effects of mental illness and brain injury.

PENDING

OVERLAP

There is a potential commitment overlap if the pending ----- application is funded in its initial submission. The PI will request approval to reduce effort in the current R01 and proposed ----- by a total of 2.0 months over the upcoming award period. There is no scientific or budgetary overlap.

STANFORD, T.

ACTIVE

5R01EY012389 (Stanford) 07/01/04-06/30/09 6.24 cal.
NIH/NEI \$225,000

“Diencephalic Mechanisms of Visuomotor Integration”

The goal of this study is to understand how motor thalamus contributes to higher order aspects of visuo-oculomotor function.

5P50DA006634 (Deadwyler) 12/01/04-11/30/09 1.2 cal.
NIH/NIDA \$157,602

“Project 5 of Program Project”

Neurophysiological Assessment of Cocaine Reinforcement in Non-Human Primates of P50 Center Grant: Center for Neurobiological Investigation of Drug Abuse, The principal focus of this project is to understand the neurophysiological substrate of cocaine addiction in primates.

1R01EY016716 (Stein) 02/1/07-01/31/12 2.4 cal.
NIH/NEI \$250,000

“Processing Visual and Multisensory Information”

The goal of this study is to examine the neural bases of unisensory and multisensory integration.

PENDING

None

OVERLAP

None