

ESNAP Report**FINAL****Form Approved Through 09/03/2007****OMB No. 0925-001****Grant Number**

5R01EY5911-23

Total Project Period

From: 09/01/1986

To: 08/31/2008

EIN:**Review Group:**

VISB

Requested Budget Period:

From: 09/01/2007

To: 08/31/2008

Title of Project:

Visual Processing in Cerebral Cortex

Due Date: 07/16/2007**Submitted Date:** 07/09/2007**Principal Investigator:**

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Applicant Organization:

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Department of Health and Human Services

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Services

NOV 16 2002

Do not exceed 56-character length restrictions, including spaces.

Council/Board (Month, Year)

Date received

1. TITLE OF PROJECT

Visual Processing in Cerebral Cortex

2. RESPONSE TO SPECIFIC REQUEST FOR APPLICATIONS OR PROGRAM ANNOUNCEMENT OR SOLICITATION NO YES

(If "Yes," state number and title)

Number:

Title:

3. PRINCIPAL INVESTIGATOR/PROGRAM DIRECTOR

New Investigator No Yes

3a. NAME (Last, first, middle)

Maunsell, John HR

3b. DEGREE(S)

PhD

3c. POSITION TITLE

Professor of Neuroscience

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Division of Neuroscience

3f. MAJOR SUBDIVISION

School of Medicine

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4. HUMAN SUBJECTS RESEARCH

4a. Research Exempt No Yes
If "Yes," Exemption No. No Yes

4b. Human Subjects Assurance No.

4c. NIH-defined Phase III Clinical Trial

 No Yes5. VERTEBRATE ANIMALS No Yes

5a. If "Yes," IACUC approval Date

10/01/2002

5b. Animal welfare assurance no

A3829-01

E. Human Subjects

None

F. Vertebrate Animals

1) All of the proposed experiments involve the use of macaque monkeys (*Macaca mulatta*). Extracellular recordings will be made from individual neurons in the cerebral cortex with the goal of bettering understanding the functional organization of human visual cortex. The animals will weigh between 4 and 12 kg, and will be of either sex. One or two animals will be used during each year of the project.

2) *In vitro* systems or computer models cannot be used to answer the questions posed. Macaque monkeys have been selected because their cortical organization is well understood and is an excellent model for human vision. Another reason for selecting macaque is that intelligent animals are needed for the demanding behavioral tasks that will be used in the experiments. Macaques learn quickly and will work consistently for several hours during daily experimental sessions. The number of animals that will be used is the lowest feasible number that can yield dependable results.

3) The Center for Comparative Medicine does daily feeding and cleaning, supervised by the PI. Veterinarians examine the animals regularly and are available at any time for consultation regarding health problems. Head restraining posts, recording chambers and eye coils are implanted under general anesthesia using sterile procedures in the surgical facility in the Division of Neuroscience.

4) Discomfort and injury to animals will be limited to that which is unavoidable in the conduct of this research, and analgesic, anesthetic, and tranquilizing drugs will be used where indicated and appropriate to minimize discomfort to the animals. All surgeries will be done under general anesthesia (isoflurane), and analgesics will be provided following recovery surgeries. For those procedures all surgical instruments, drapes and dressings will be sterilized. The operating room will be disinfected and all surgical personnel will wear sterile gowns,

normal primate sitting posture. During training or recording sessions, the animal's head is restrained for monitoring eye position. Head posts allow head stabilization without pressure on the skin. The length of training or recording sessions is controlled by the animal's interest in working, and is typically two to four hours. Each animal remains completely unrestrained in its home cage except during training or recording sessions. During training and recording the animal's water intake is restricted and it works for a fluid reward. All training is accomplished by operant conditioning using positive rewards. No aversive conditioning is used. When water intake is restricted, the animal's hydration is monitored daily by fluid intake, weight, skin turgor and examination of feces. Animals that do not work for sufficient fluid are given additional water.

5) At the conclusion of physiological experiments, animal subjects will be euthanized by deeply anesthetizing with barbiturates followed by perfusion to assure the proper fixation necessary for the anatomical studies. This procedure conforms to the guidelines established by the Panel on Euthanasia of the American Veterinary Medical Association.

G. Literature Cited

Abeles, M., Prut, Y., Bergman, H. and Vaadia, E. (1994) Synchronization in neuronal transmission and its importance for information processing. *Prog. Brain Res.* 102:395-404.

Albrecht, D.G. and Geisler, W.S. (1991) Motion selectivity and the contrast-response function of simple cells in the visual cortex. *Vis. Neurosci.* 7:531-546.

Albrecht, D.G., Geisler, W.S., Frazor, R.A. and Crane, A.M. (2002) Visual cortex of monkeys and cats: temporal dynamics of the contrast response function. *J. Neurophysiol.* 88:888-913.