Project #: B-10-628
Center #: R6823-0AO

Contract#: SUBCONTRACT DTD 9/12/89
Prime #: KA1-8901-1

Subprojects ? : N
Main project #: 

Project unit: OIP
Project director(s): KENNEDY P R

Sponsor/division names: EMORY UNIVERSITY
Sponsor/division codes: 400

Award period: 890715 to 900714 (performance) 900914 (reports)

Sponsor amount
Contract value 27,272.00
Funded 27,272.00
Cost sharing amount 0.00

Title: ACCESSING CONTROL SIGNALS IN MOTOR CORTEX FOR RESTORATION OF MOVEMENTS...

PROJECT ADMINISTRATION DATA

OCA contact: Ina R. Lashley 894-4820
Sponsor technical contact

DR PHILIP R KENNEDY, M.D.
(404)894-4257
YERKES PRIMATE CENTER
EMORY UNIVERSITY
ATLANTA GA 30322

Security class (U,C,S,TS) : U
Defense priority rating : N/A
Equipment title vests with: Sponsor
NONE PROPOSED

Administrative comments - INITIATION OF SUBCONTRACT.
GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

NOTICE OF PROJECT CLOSEOUT

Closeout Notice Date 04/09/92

Project No. B-03-628_________ Center No. R6823-0A0_______

Project Director KENNEDY P R__________ School/Lab BEC__________

Sponsor EMORY UNIVERSITY/ATLANTA, GA________________________

Contract/Grant No. SUBCONTRACT DTD 9/12/89______ Contract Entity GTRC

Prime Contract No. KAl-8901-1________________________

Title ACCESSING CONTROL SIGNALS IN MOTOR CORTEX FOR RESTORATION OF MOVEMENTS...

Effective Completion Date 900714 (Performance) 900914 (Reports)

Closeout Actions Required: Date Submitted

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Comments__________________________________________________________________________________________

Subproject Under Main Project No. __________________

Continues Project No. __________________

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PART II SECTION A:

1. **TITLE:** LONG-TERM RECORDING OF NEURAL SIGNALS FROM MONKEY.

   **KEYWORDS:** Unit recordings, monkeys, cone electrode, neural prosthetics, conditioning.

   Axis II: 21.

3. PRC Unit: Division of Neurobiology.

4. (a) Kennedy, Philip R.
   (b) MD, PhD.
   (c) Division of Neurobiology.
   (d) (O): Collaborative.

   Co-Investigators:

   (a) Tigges, Johannes
   (b) PhD.
   (c) Chief, Division of Neurobiology
   (d) (C).

   (a) Bakay, Roy A.E.
   (b) MD
   (c) Division of Neurobiology
   (d) (C)

   (a) Mirra, Sue
   (b) MD
   (c) Division of Neuropathology, VA
   (d) (O)

5. Species: Macaque Mulatta.


7. Non-Host Institution: Georgia Institute of Technology
   Atlanta, Georgia 30332.

   Veterans Administration Med. Center
   Clairmont Road
   Atlanta, Georgia

8. **Abstract**

   Objectives: Determine [1] how long would the Cone electrode continue to monitor neural signals in monkeys, [2] what can be reveal at the electronmicroscopic level regarding the tissue inside the cone, [3] if neurotrophic substances can be used in the monkey to produce neural signals from the electrode, [4] if single units...
The significance of this research in primates is that it will allow monitoring of neural signals over long time periods for the study of motor control, sensory responses, sensori-motor integration, plasticity experiments in the motor and sensory systems with its attendant questions of learning and memory, and, not least, its possible role as a neural prosthetic controller.

Methodology: Similar to the rat (see paper).

Results: [1] Recordings have continued until 15 months in one monkey who damaged the implant at that time. Waveshapes have been separated and their waveshape parameters applied to all recording sessions over the 15 months. This has revealed similar waveshapes for two units consistently, and for three other units during most sessions. [2] EM studies in monkey and rat show some myelinated neuronal processes inside the cone, as well as astrocytic cells, collagen and other material. To study this more closely, rats are being used that have cone electrodes filled with neurotrophic substances that result in recording of neural signals. At the EM level, myelinated fibers have been seen throughout the cone tissue. These studies are continuing in rats whose cone electrodes are being harvested at intervals after implantation.

[3] Five electrode implants were made with neurotrophic substances (Matrigel or Laminin) inside the cone. Disappointingly, no signals were recorded from these implants. This may well be due to the possibility that the neurotrophic substances were inadequate and no neurites grew into the cone. The implant preparation is still intact and histological examination will be made in due course.

[4] Experiments are getting underway to study the possibility that monkeys can control the firing of their own separated single units. These behavioral experiments require major equipment that has been installed and modified over the past few months.

SECTION B2:

Non-Host Institution:

Kennedy, P.R.
(a) FED, NIH
(b) (Nothing specified in the instructions).
(c) 5 RO1 NS24602-02
(d) $102,816.

Kennedy, P.R.
(a) PVAS
(b) (Nothing specified)
(c) APA Contract #KA1-8901-1
(d) $30,000

Kennedy, P.R.
(a) FDN (Emory-Georgia Tech)
(b) Nothing specified)
SECTION C:

LIST OF PUBLICATIONS

The following paper has been submitted to IEEE Trans. Biomed. Eng. for publication:


The following paper forms the basis for the monkey implants:


Abstracts:


Long-term recording of the same cortical units in monkeys using the cone electrode. Kennedy, P.R., Banks, D.M. and Bakay R.A.E. 21st Annual Neural Prosthesis Workshop, National Institutes of Health, October 1990.