N69 18293

PROGRESS REPORT

NASA ORDER NO. R-39

CONDUCT RESEARCH ON THE EFFECTS OF VERY STRONG MAGNETIC FIELDS AND OF MAGNETIC FIELD-FREE ENVIRONMENTS ON MAN AND ANIMALS

Prepared for Biotechnology and Human Research Division, Code RB
National Aeronautics and Space Administration Headquarters

By

D. E. Beischer, Ph.D.
Principal Investigator

Period Covered

1 November 1968 - 31 January 1969

NAVAL AEROSPACE MEDICAL INSTITUTE
NAVAL AEROSPACE MEDICAL CENTER
PENSACOLA, FLORIDA 32512

4

PROGRESS REPORT ON THE EFFECTS OF VERY STRONG MAGNETIC FIELDS AND OF MAGNETIC FIELD-FREE ENVIRONMENTS ON MAN AND ANIMALS

Prepared for Biotechnology and Human Research Division, Code RB
National Aeronautics and Space Administration Headquarters

By

D. E. Beischer, Ph.D.
Principal Investigator

Period Covered

1 November 1968 - 31 January 1969

NAVAL AEROSPACE MEDICAL INSTITUTE
NAVAL AEROSPACE MEDICAL CENTER
PENSACOLA, FLORIDA 32512

NASA R-39 PROGRESS REPORT

A. Biological effects of strong magnetic fields.

1. The superconducting magnet.

The performance of the magnet delivered by Gardner is still not yet up to specifications and at this time the instrument has not been accepted. At present the power supply is being repaired. The trouble with this magnet is that the offer of the lowest bidder, Gardner Cryogenics Corporation had to be accepted against our better knowledge and protest. Gardner had little experience in the construction of superconducting magnets and this delayed getting the magnet in operation. As compensation the company has granted a price reduction. It is hoped that the magnet will be in operation soon. A report is in preparation on the advantages of superconducting magnets in electrophysiological research.

2. Nerve excitability.

Action potentials were registered from frog sciatic nerve. Improvements of the measurement technique are made. These changes should increase both the accuracy and speed of potential and conduction velocity measurements to be made in strong magnetic fields. Such measurements have to wait for the completion of the superconducting magnet.

3. Enzyme reactions.

Studies on the effects of strong magnetic fields up to 15 kilogauss on the activation of trypsin have been completed and a report is in preparation. Previous observation of an activation of this enzyme by Smith and Cook could not be

confirmed. It appears at present unlikely that any enzyme is changed in its activity by magnetic fields under 20 kilogauss.

4. Studies of primates in high magnetic fields.

A chimpanzee is in the process of being trained for exposure to the field of the large 20-inch superconducting magnet at NASA Lewis Research Center, Cleveland, Ohio. The measurements on this animal in fields from 10 kilogauss to 100 kilogauss will include EEG, ECG and behavioral observations.

Previous observations of squirrel monkeys in another superconducting magnet at Lewis have been evaluated further and have been submitted for publication.

B. Null magnetic field environment.

Preparations are in progress for the exposure of more human subjects in the null magnetic fields of a coil system and of the Pensacola shielded room. A comparison of the characteristics of a coil system and magnetically shielded room have been made and the results were submitted for publication.

Reports and Publications

1. Molins, E. A., and Reno, V. R. A venting alarm system for cryogenic liquids. NAMI-1059, NASA Order R-39. Pensacola, Fla.: Naval Aerospace Medical Institute. In print.

2. Gaber, W. R., Reno, V. R., and Reinhardt, D. L. Performance of rodents in the magnetic field dispersed. NASA Order R-39. Pensacola, Fla.: Naval Aerospace Medical Institute. Report in preparation.

3. Beischer, D. E. Vectorcardiogram and cardiac blood flow of squirrel monkeys (Saimiri sciureus) in a strong superconductive electromagnet. In: Biological Effects of Magnetic Fields, Vol. 2, M. F. Barnothy (Editor), Plenum Press, New York, New York. Accepted for publication.

4. Beischer, D. E. Magnetohydrodynamic potentials and the electrocardiogram in the squirrel monkey (Saimiri sciureus). Science. Submitted for publication.

5. Beischer, D. E. Generation of low magnetic field environment for study of space null magnetic field effects on man. Accepted for publication in the Proceedings of the Annual Meeting of the Institute of Environmental Sciences, 1969.