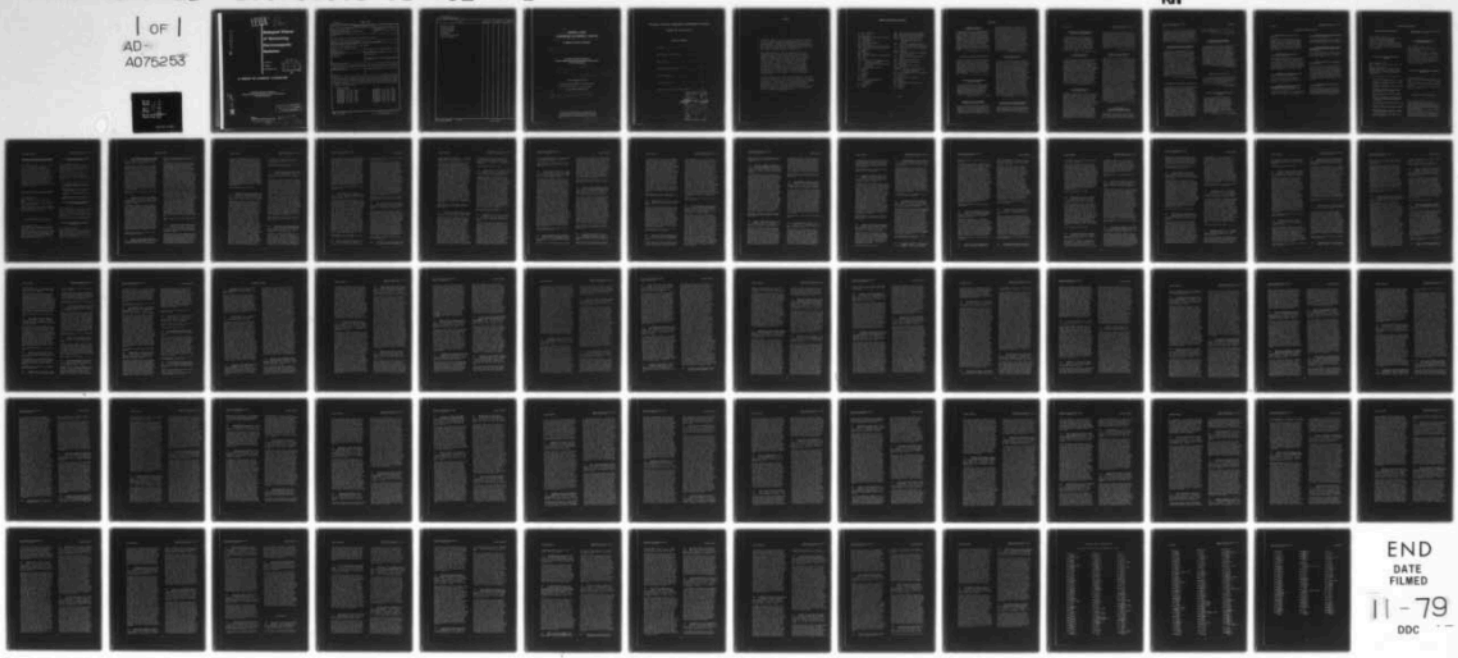
AD-A075 253 FRANKLIN RESEARCH CENTER PHILADELPHIA PA SCIENCE INF--ETC F/G 6/18
BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION. VO--ETC(U)
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Biological Effects of Nonionizing Electromagnetic Radiation

VOLUME IV
NUMBER 1
SEPTEMBER, 1979

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A DIGEST OF CURRENT LITERATURE

V3 n1
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A Quarterly Publication Produced for
National Telecommunications and Information Administration
and United States Navy

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410 886
79 10 09 073

Unclassified

ERRATA SHEET

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Franklin Research Center Science Information Services Organization Philadelphia, PA 19103	2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP

3. REPORT TITLE:

Biological Effects of Nonionizing Electromagnetic Radiation

4. DESCRIPTIVE NOTES (Type of report and inclusive dates):
Quarterly Report: June, 1979-September, 1979 (Volume IV, Number 1)

5. AUTHOR(S) (First name, middle initial, last name)
Bruce H. Kleinstein, Ph.D., J.D., Project Manager
Sheryl A. Dyner, Managing Editor

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September, 1979	61	
8a. CONTRACT OR GRANT NO HO-A01-78-1157 b. PROJECT NO c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) 80G-C5003-01 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	

10. DISTRIBUTION STATEMENT
Previous issues of the digest can be obtained from the National Technical Information Service (NTIS), Springfield, Virginia 22161. The accession numbers for these issues are listed below.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY

13. ABSTRACT

This quarterly digest presents current awareness information on the biological effects of nonionizing electromagnetic radiation (microwave and radio frequency) in the range of 0 Hz to 100 GHz. The effects of magnetic and electric fields (static and alternating) are also covered. Each issue contains abstracts of English and foreign current literature, summaries of ongoing research investigations, news items, and a directory of meetings and conferences.

Accession Numbers

AD-A034926 I(1-2): June-Sept., 1974	AD-A040681 I(4): Jun., 1977
AD-A034423 I(3): Dec., 1974	AD-A043458 II(1): Sep., 1977
AD-A034893 II(1): Mar., 1975	AD-A047647 II(2): Dec., 1977
AD-A034426 II(2): Jun., 1975	AD-A052779 II(3): Mar., 1978
AD-A034429 II(3): Sep., 1975	AD-A055569 II(4): Jun., 1978
AD-A034430 II(4): Dec., 1975	AD-A059870 III(1): Sep., 1978
AD-A034166 I(1): Oct., 1976	AD-A061947 III(2): Dec., 1978
AD-A034895 I(2): Jan., 1977	AD-A065989 III(3): Mar., 1979
AD-A039956 I(3): Apr., 1977	AD-A070242 III(4): Jun., 1979

DD FORM 1473 (PAGE 1)

S/N 0102-014-6700

Unclassified

Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
biologic effects						
electric fields						
electromagnetic						
magnetic field						
microwaves						
nonionizing radiation						
radio frequency						

(6)

BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION.

Volume II, Number 1.

A Digest of Current Literature

(9) Quarterly rept. Jun–Sep 79,

A Quarterly Publication Produced for
National Telecommunications and Information Administration
and United States Navy

(12) 68

(11) Sep 79

(15) HO-A01-78-1157

Literature Selected and Abstracted
by
Biomedical Group, Science Information Services Organization

(10) Bruce H. Kleinstein, Ph.D., J.D., Project Manager
Sheryl A. Dyner, Managing Editor

(14) 8QG-C50Q3-01-VOL-4-1

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BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION

September, 1979 Volume IV, Number 1

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PREFACE

Biological Effects of Nonionizing Electromagnetic Radiation is a publication researched and prepared by the Franklin Research Center, Science Information Services Organization, under contract to the National Telecommunications and Information Administration (NTIA); funding provided by the U.S. Navy under interagency agreement with NTIA.

This digest serves as a vehicle through which current documentation of research highlights on the biological effects and health implications of nonionizing electromagnetic radiation (microwave and other radio frequency radiation) are compiled, condensed, and disseminated on a regular basis. *Biological Effects of Nonionizing Electromagnetic Radiation* is intended to be a highly useful current awareness tool for scientists engaged in research or related activities. The great number and diversity of relevant publications make imperative the availability of the service to persons whose work requires that they keep abreast of current developments in the field.

Biological Effects of Nonionizing Electromagnetic Radiation is published quarterly. The issues of Volume IV, and future volumes, will include materials received during the preceding three months. Each issue will include news items and announcements, a listing of meetings and conferences, abstracts of current literature, and a directory of current research. Materials for which full text is not available will be included as summary abstracts.

ABBREVIATIONS AND ACRONYMS

A, amp - ampere(s)
Å - angstrom(s)
BRH - Bureau of Radiological Health
C - centigrade
cm - centimeter(s)
cps - cycles per second
dB - decibel(s)
EPA - Environmental Protection Agency
FDA - Food and Drug Administration
g - gram(s)
G - Gauss
GHz - gigahertz
HEW - Health, Education, and Welfare
hr - hour
Hz - hertz
IEEE - Institute of Electronic and Electrical Engineers
IMPI - International Microwave Power Institute
IU - international unit(s)
J - joule(s)
k - kilo--
l - liter(s)
m - meter(s)
m - milli--
M - mega--
mho - unit of measurement of conductivity
min - minute(s)
mo - month(s)
n - nano--
NBS - National Bureau of Standard
NIH - National Institutes of Health
NSF - National Science Foundation
NIOSH - National Institute for Occupational Safety and Health
NTIA - National Telecommunications and Information Administration
NTIS - National Technical Information Service
Oe - oersted(s)
OSHA - Occupational Safety and Health Administration
OTP - Office of Telecommunications Policy
PHS - Public Health Service
rad - radiation absorbed dose
R - roentgen(s)
rpm - revolutions per minute
sec - second(s)
USAFSAM - U.S. Air Force School of Aerospace Medicine
USDA - U.S. Department of Agriculture
UV - ultraviolet
V - volt(s)
VA -Veterans Administration
W -watt(s)
Wb - Weber(s)
WHO - World Health Organization
wk - week(s)
wt - weight
yr - year(s)

μ - micro--

NEWS ITEMS

GERMANS STUDY EFFECTS OF MICROWAVES ON LIVING CELLS

In response to the growing use of microwave ovens in the Federal Republic of Germany and the lack of information about possible nonthermal effects of microwaves, scientists at the Max Planck Institute of Research into Solid State Physics in Stuttgart and the Radiation and Environmental Research Association in Neuherberg plan to study the effect of electromagnetic millimeter waves on living cells. In the project, promoted by the German Research Association, yeast cells will be bombarded with microwaves of varying lengths and the effects on cell colony growth and individual cell behavior will be analyzed. Extremely sensitive instruments are now being developed at the Max Planck Institute to measure these effects.

Dtsch Forschungsdienst 17(12): 6; 1978.

PIGEONS SENSE CHANGES IN EARTH'S MAGNETIC FIELD

Pigeons have recently been found to have the ability to sense minute changes in the Earth's magnetic field or in the barometric pressure, according to Cornell biologist Timothy Larkin and his associate William Keeton, in experiments conducted on pigeon homing behavior over the last 4 yr. The scientists have also discovered that the birds can detect low frequency sounds at hundreds of kilometers, can see light waves that are invisible to man, and can detect the moon's position and then use it to set their flight paths.

Bioscience 29(4): 263; 1979.

ATTENDANCE HIGH AT 1979 INTERNATIONAL MICROWAVES SYMPOSIUM

The 1979 International Microwave Symposium was held in Orlando, Florida from April 30 through May 2, 1979. The theme of this year's conference was "The World of Microwaves--What's Next?". The technical highlights featured new semiconductor developments and miniaturizations. Several awards were presented to those who made outstanding contributions in the field.

Microwaves 18(4): 10, 11, 13; 1979.

MASSACHUSETTS ACTIVISTS SUE TO PREVENT MICROWAVE TEST RANGE INSTALLATION

Residents of two Massachusetts' towns, Wayland and Stow, have filed suit against two electronic firms, Raytheon Co. of Lexington and Radant Systems, Inc. of Wayland to prevent the installation of two microwave test ranges in their communities. The citizens are concerned that the ranges, used to map an antenna's beam pattern, may be hazardous to the residents by exposing them to microwaves. The major concern, according to a Wayland English teacher, George W. Faison, "is that there are few standards for exposure, and those that exist differ and are arbitrary." In response to the citizens' concern, Richard H. Park, president of Radant Systems, Inc. demonstrated that on a road directly in front of and 2,000 feet away from the test range's antenna, the exposure would be about 0.1 $\mu W/cm^2$ and at a sidelobe, would be only about 0.003 $\mu W/cm^2$. He insists that the power densities generated by his company's range in Stow would be only about one-ninth those measured by the EPA in the heart of Boston. Park's response has not assuaged the citizens' concern and he feels that the information on any long-term effects of microwave exposure on peoples' health must come from the medical profession and that could "take upwards to 10 years."

Electronics 52(8): 48-49; 1979.

RESEARCHERS LINK HEART ATTACKS WITH GEOMAGNETIC ACTIVITY

A significant relationship between the frequency of heart attacks and the earth's magnetism has been found by S. R. C. Malin of the Institute of Geological Sciences in Edinburgh, Scotland and B. J. Srivastava of the National Geophysical Research Institute in Hyderabad, India. Data on cardiac emergencies occurring in Hyderabad and Secunderabad, India from 1967 to 1972 was obtained from hospitals and compared on a day-by-day basis with measurements of the earth's geomagnetic activity. Even allowing for possible seasonal effects of weather or diet on heart attack occurrence, the correlation between geomagnetic activity and cardiac emergencies was statistically significant. The results do not agree with those from a similar study made in the United States from 1962 to 1966 by B. J. Lipa and associates. Drs. Malin and Srivastava suggest that the discrepancy may be due to the artificial magnetic disturbances of cars, industry, and appliances, which are common in the United States, that may mask the underlying statistical relation between geomagnetic activity and the incidence of heart attacks. The scientists have no clinical explanation for their findings, however, they suggest there may be some other cause, possibly of solar origin, that is responsible for both the magnetic and medical phenomena.

New York Times, p. C5; April 24, 1979.

RADIO SCIENCE TO PUBLISH SPECIAL SUPPLEMENT ON BIOLOGIC EFFECTS OF ELECTROMAGNETIC WAVES

A Special Supplement to *Radio Science* containing selected papers from the 1977 Airlie Symposium on the "Biological Effects of Electromagnetic Waves" will be published in December 1979.

IMPI News Release

PATENT ISSUED FOR A RF THERMOGRAPHY DEVICE THAT IMPROVES FIELD INTENSIFICATION

A patent was issued for a device that will increase the intensity of the electromagnetic field used in radio frequency thermography. An inductance element that is part of the circuit tuned to the frequency of the electromagnetic field being applied to the tumor is implanted in the vicinity of the tumor, thereby increasing the intensity of the field near the tumor without causing any significant damage to the adjacent normal tissue. The device bears U.S. patent number 4,154,246.

Official Gazette 982(3): 887; 1979.

BRH APPROVES MICROWAVE OVEN CORRECTIVE ACTION PLAN

The BRH has approved corrective plans for 2,394 Roper and 251 Sears Kenmore free-standing common cavity microwave/conventional ovens, marketed after July 12, 1976 that failed to meet safety standards established in the Radiation Control for Health and Safety Act of 1968. The ovens (Roper units 2356W00, 2356A00, 2356C00, 2356H00, 2356W10, 2356A10, 2356C10, and 2356H10 and Sears models 103.9547615, 103.9547625, 103.9547645, and 103.9547665) have a primary interlock system that may fail to meet the standard's definition of a safety interlock under certain operational conditions. Corrections will be performed free of charge by the dealer, distributor, and factory and will include replacement of the lock box with a new box containing the handle, door hook assembly, primary interlock switch, and secondary interlock; replacement of the thermofuse with a 15-A fuse; and securing to the modified oven a new wiring diagram depicting the modifications.

BRH Bulletin 12(7): 5-6; 1979.

LOW-LEVEL MICROWAVES AFFECT RATS' RESPONSE TO LIBRIUM

Researchers at the Naval Medical Research Institute in Bethesda, MD have found that low-level microwaves change the response of laboratory rats to the tranquilizer Librium. The Navy is interested in these effects on Librium's action since the drug is commonly prescribed to relieve tension on board ship. John R. Thomas, working with Linda S. Burch and Stephen S. Yeandle, determined that rats worked harder (i.e., pushing a button to receive food pellets at a faster rate) when exposed to as little as 1 mW/cm^2 of pulsed power. This power level, at 2.45 GHz, is typical of that found near radar equipment aboard ship. The microwaves were emitted from a standard-gain horn antenna oriented so that the electrical field was vertically polarized around the rats and the animals were kept 3.75 wavelengths from the antenna so that near-field conditions applied. The tests were structured so that the responses of the rats depended only on whether the microwave radiation was turned on, thereby eliminating changes caused by other variables. The researchers have not yet determined how microwaves and Librium interact with each other, but they are fairly certain that the behavioral change was not due to heating effects. Thomas plans to work with other major drugs that affect the central nervous system to see if their action is also affected by microwaves. He stresses, however, that the results of his experiments cannot yet be applied to human beings and that there is a big difference between exposing a biologic system to radiation and the amount of radiation actually absorbed.

Electronics 52(9): 46; 1979.

SMOKESTACK ANTI-POLLUTION DEVICES GENERATE ELECTROMAGNETIC FIELDS

Government scientists have discovered that a new type of pollution, invisible thunderstorms of highly charged electrical particles, is being generated by anti-pollution devices installed in smokestacks to clean the air. The scientists speculate that increased airborne electricity may affect the amount of rainfall, and they are concerned because little is known about the effect of electrical charges in the air on plant and animal life. According to the study conducted by William Cobb, Billy Caldwell, and Dennis Wellman of the National Oceanic and Atmospheric Administration (NOAA), Atmospheric Physics and Chemistry Laboratory in Boulder, Colorado, these devices, which effectively reduce the fly ash from the smokestacks, create plumes of highly negatively charged particles that escape from the anti-pollution devices and are transported downwind where they add their charge to the normal atmospheric electrical condition. Measurements taken from an aircraft about 800 feet downwind from the smokestacks of coal-fired power plants near Emery, Utah; Farmington, New Mexico; and Colstrip, Montana have recorded atmospheric electrical charge equivalent to that in a thunderstorm. The scientists report that it would take about 250 smokestacks with these devices to equal the electrical charge of one thunderstorm and that "the possibility exists that the increasing production of electrical charge in the atmosphere may at some point affect the global circuit current." The scientists indicate that further research on the effects of these invisible thunderstorms on plant and animal life is necessary since it seems unlikely that organisms living beneath these areas would not be affected in some way.

Philadelphia Inquirer, p. 5-A: June 22, 1979.

ITALIAN JOURNAL *ALTA FREQUENZA* PLANS SPECIAL ISSUE ON NONIONIZING ELECTROMAGNETIC RADIATION

Alta Frequenza plans to publish a special issue (March 1980) on "Electromagnetic Non-ionizing Radiations: Biological Effects and Relevant Measurements. Electromagnetic Compatibility and Relevant

Measurements." Papers to be included in the issue will deal with the biologic effects of nonionizing electromagnetic fields, the evaluation of radiation hazards and criteria for determining and defining safety standards, therapeutic and diagnostic applications, electromagnetic compatibility, instrumentation and international calibration cycles, the generation of uniform field intensity in a restricted space, and ways to lower radiation levels.

Alta Frequenza 48(2): 42-2E; 1979.

MICROWAVE-INDUCED LOCAL TUMOR HYPERTHERMIA ENHANCES CHEMOTHERAPY OF LUNG TUMORS

Researchers at the National Cancer Institute in Bethesda have used microwave-induced local tumor hyperthermia (LTH) and specially formulated heat-labile liposomes to enhance methotrexate (MTX) accumulation in Lewis lung carcinomas in mice. Microwave power at 2,450 MHz was used to maintain a constant temperature of 42 ± 0.1 C in the center of each heated tumor, while liposomes containing ^{3}H-MTX were injected into the tail vein of the mice. The heating period was maintained for 60 min. Microwave LTH doubled the rate at which liposome encapsulated ^{3}H-MTX was removed from the blood and enhanced accumulation in the heated tumors 4.3 times that in the untreated controls at 4 hr after injection. Enhanced clearance or accumulation was not found when local hyperthermia was used. The researchers findings lead them to suggest that the accumulated MTX was intracellular and bound to its target enzyme dihydrofolate reductase.

Bioelectromagnetics Society Newsletter, (6): 1, April 1979.

A NEW JOURNAL, *BIOELECTROMAGNETICS*, IS ANNOUNCED

A new journal, *Bioelectromagnetics*, sponsored by the Bioelectromagnetics Society has been announced. The journal will be a quarterly and Volume 1 is scheduled for publication by Alan R. Liss, Inc., New York in 1980. This journal will be devoted to research on the interaction of electromagnetic fields with biologic systems. The electromagnetic spectrum from constant fields to visible light will be covered. *Bioelectromagnetics* will consider for publication articles reporting complete findings of original research. The major areas of interest will include: responses of biologic systems to electromagnetic environments, mechanisms of electromagnetic field and biologic process interaction, absorption and distribution of electromagnetic energy within biologic systems, and diagnostic and therapeutic uses of electromagnetic radiation or fields. Concise critical reviews of current research developments will also be published. Manuscripts and editorial correspondence should be addressed to the editor: Dr. Elliot Postow, *Bioelectromagnetics*, Building 142, National Naval Medical Center, Bethesda, MD 20014. Instructions for contributions can be obtained from either the editor or the publisher.

Bioelectromagnetics Society Newsletter, (6): 3, April 1979.

USSR ACADEMY OF SCIENCES ORGANIZES A NEW BIOELECTROMAGNETICS SECTION

A new bioelectromagnetics section of the USSR Academy of Sciences has recently been organized by the Scientific Counsels for Biophysics and Radiobiology. Professor I. G. Akoev will head the section and will coordinate investigations on the biologic effects of high frequency electromagnetic fields (from the radio frequency range through millimeter waves) and static and low frequency magnetic and electric fields. The research will be conducted as part of an overall program dealing with problems of the physical environment and investigations will include studies of the mechanisms and interaction of biologic systems and different environmental factors (electromagnetic and acoustic waves, vibration, acceleration, and temperature).

Bioelectromagnetics Society Newsletter, (6): 4; April 1979.

GHANDI ELECTED FELLOW OF THE IEEE

Dr. O. P. Ghandi was elected Fellow of the Institute of Electrical and Electronics Engineers "for contributions to the understanding of nonionizing radiation effects, to the development of electron devices and to engineering education."

Utah Bioengineering Newsletter, Spring Issue, 1979.

NEW NTIA TASK FORCE ON NONIONIZING RADIATION ANNOUNCED

A federal interagency task force has been established to develop a coordinated plan for all government sponsored research on the biologic effects of nonionizing electromagnetic radiation. The announcement was made by Henry Geller, the Assistant Secretary of Commerce for Communication and Information and the head of the NTIA. NTIA will serve as the leading agency for the task force. Additional information on the new task force may be obtained from NTIA, 1800 G Street, N.W., Washington, DC 20504.

Bioelectromagnetics Society Newsletter, (7): 1; 1979.

ITEMS FROM THE COMMERCE BUSINESS DAILY

☐ **MICROWAVE INTERACTION WITH NERVE CELL MEMBRANES.**

The Environmental Protection Agency, Contracts Management Div., Office of Administration, Research Triangle Park, NC 27711 is negotiating with Duke University, Department of Biomedical Engineering, Durham, NC 27706 for a study to measure neonatal transmembrane currents that are induced by microwave fields and to determine whether such currents are attributable to a membrane detection process. (April 24, 1979)

☐ **IDENTIFICATION OF SITES IN BRAIN TISSUE AFFECTED BY NON-IONIZING EMR.**

The Environmental Protection Agency, Contracts Division, Office of Administration, Research Triangle Park, NC 27711 is negotiating with the Research Triangle Institute, P.O. Box 12194, Research Triangle Park, NC 27709 for this study concerning identification of sites in brain tissue that can be affected by electromagnetic radiation using the 2-deoxyglucose method as the primary means to identify sites of altered brain/metabolic activity. (May 4, 1979)

☐ **RESEARCH ON THE EFFECTS OF ELECTROMAGNETIC ENERGY ON THE IMMUNE SYSTEM OF MAMMALS.**

The Office of Naval Research, 800 Quincy St., Arlington, VA 22217 has contracted with the University of Illinois, Urbana, IL 61801 for the above study. (May 22, 1979)

☐ **CONTINUED RESEARCH AIMED AT MORE PRECISELY IDENTIFYING AND PREDICTING THE EFFECTS OF ELECTROMAGNETIC ENERGY UPON THE NERVOUS SYSTEM.**

The Office of Naval Research, Arlington, VA 22217 is negotiating with Randomline, Inc., Huntingdon Valley, PA 19006 for the above study. (May 29, 1979)

☐ **DETERMINATION OF ELECTROMAGNETIC PARAMETERS THAT AFFECT THE BRAIN AND BEHAVIOR.**

The Office of Naval Research, Arlington, VA 22217 is negotiating with Randomline, Inc., Huntingdon Valley, PA 19006 for the above study. (June 4, 1979)

☐ **DETERMINATION AND IDENTIFICATION OF EVOKED MAGNETIC FIELDS OF THE HUMAN BRAIN ASSOCIATED WITH AUDITORY STIMULATION.**

The Office of Naval Research, Arlington, VA 22217 has contracted with the University of Colorado Medical Center, Denver, CO 80220 for the above study. (June 6, 1979)

☐ **CEREBELLAR HISTOGENESIS IN RATS EXPOSED TO 2450 MHz RADIATION.**

Microwaves are suspected of causing delay in the gross body weight of rodents and also of subtle morphologic changes in the central nervous system (CNS). This project is designed to determine if the gross body weight decreases are associated with maturational delays in CNS structure. The EPA, Contracts Management Division (MD-33) Office of Administration, Research Triangle Park, NC 27711 is negotiating with George Washington University, Washington, DC 20007 for the above study. (June 20, 1979)

☐ **THE EFFECTS OF MICROWAVE RADIATION ON CEREBRAL METABOLISM.**

The Environmental Protection Agency, Office of Administration, Research Triangle Park, NC 27111 has contracted with the Duke University Medical Center, Department of Radiology, Durham, NC 27706 for the above study. (June 29, 1979)

MEETINGS AND CONFERENCES

NINTH EUROPEAN MICROWAVE CONFERENCE

Date: September 17-21, 1979
Place: Brighton, England: The Brighton Centre
Sponsor: Inst. of Electrical Engineers, Inst. of Electronic and Radio Engineers
Requests for Information: Professor Peter Clarricoats, European Microwave Conference Chairman, Dept. Electrical & Electronic Engineering, Queen Mary Coll., Mile End Rd., London, E.1. 4NS, England
Content: Topics will include microwave technology and instrumentation

PRACTICAL APPLICATIONS OF MICROWAVE ENERGY SYMPOSIUM

Date: September 28, 1979
Place: Manhattan, KS: K-State Union, Kansas State Univ.
Sponsor: Kansas State Univ.
Requests for Information: Dr. D. Y. C. Fung, Chairman, Kansas State Univ., Manhattan, KS 66506
Content: Topics will cover the practical aspects of microwave energy related to the welfare of the general public

Selected Bibliography of Papers to be Presented:

PRINCIPLES OF MICROWAVE RADIATION. B. Curnutte

A REVIEW OF THE BIOLOGICAL HAZARDS OF MICROWAVE RADIATION. J. P. Lambert

EFFECTS OF MICROWAVES ON MICROORGANISMS IN FOODS: A REVIEW. D. Y. C. Fung

INFLUENCE OF MICROWAVE RADIATION ON PSYCHROTROPIC BACTERIA. F. E. Cunningham

DESIGN AND UTILIZATION OF DOMESTIC MICROWAVE OVEN. P. J. Annis

WHAT DOES THE FUTURE HOLD FOR MICROWAVE ENERGY IN RELATION TO CONSUMERS AND THE INDUSTRY? R. F. Schiffmann

EFFECTS OF MICROWAVE COOKING ON QUALITY OF FOODS. D. L. Harrison

EFFECTS OF MICROWAVE COOKING ON CEREAL PRODUCTS. C. C. Tsen

TECHNICAL ADVANCEMENTS ON THE USE OF MICROWAVES AS AN ANALYTICAL TOOL. M. Collins

APPLICATIONS AND EFFECTS OF MICROWAVES ON TEXTILES. B. M. Reagan

APPLICATION OF MICROWAVE ENERGY IN MEAT PROCESSING RESEARCH. D. H. Kropf

ENGINEERING IN MEDICINE AND BIOLOGY: 32nd ANNUAL CONFERENCE

Date: October 6-10, 1979
Place: Denver, CO: Denver Hilton Hotel
Sponsor: Alliance for Engineering in Medicine and Biology (AEMB)
Requests for Information: Mrs. P. I. Horner, Administrative Director, Alliance for Engineering in Medicine and Biology, 4405 East-West Highway, Suite 404, Bethesda, MD 20014
Content: Topics will include bioelectric signals--EKG, EEG, EMG; biomaterials; biotelemetry; non-invasive diagnostic technology; biomedical transducers; mathematical models and simulation; microprocessors in biomedical applications; and standards and regulations

1979 IEEE INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

Date: October 9-11, 1979
Place: San Diego, CA: Town & Country Hotel
Sponsor: Inst. of Electrical & Electronics Engineers (IEEE)
Requests for Information: F. J. Nichols, LectroMagnetics, Inc., 6056 W. Jefferson Blvd., Los Angeles, CA 90016
Content: Will include sessions on biomedical areas, hazards, and standards

WESTERN OCCUPATIONAL HEALTH CONFERENCE

Date: October 11-13, 1979
Place: San Francisco, CA: Fairmont Hotel
Sponsor: Western Occupational Medical Assoc. (WOMA), American Industrial Hygiene Assoc. (AIHA), Health Physics Society (HPS), American Society of Safety Engineers (ASSE), Western Assoc. Occupational Health Nurses (WAOHN)
Requests for Information: B. H. Bravinder, WOMA, Box 201, Alamo, CA 94507
Content: Topics will include fundamentals and new directions in industrial hygiene, fundamentals of radiation safety, magnetic fields in new and old technologies and their potential biomedical effects

NTERNATIONAL RADIATION PROTECTION ASSOCIATION: SECOND ASIAN REGIONAL CONFERENCE ON RADIATION PROTECTION

Date: November 5-9, 1979
Place: Manila, Philippines: Philippine Plaza Hotel
Sponsor: Philippine Assoc. for Radiation Protection; Japan Health Physics Society
Requests for Information: Dr. Celia T. Anatalio, Congress President, Director, Radiation Health Office, Ministry of Health, San Lazaro Compound, Rizal Avenue, Sta. Cruz, Manila, Philippines
Content: Topics will include environmental radiation hazards and protection; medical radiation hazards and protection, nuclear power and irradiation facilities; dosimetry; public education and acceptance; research and new developments in radiation protection, regulations, codes and standards; nonionizing radiation; special topics on radiation protection; and health physics training and manpower development

RADIOLOGICAL SOCIETY OF NORTH AMERICA: ANNUAL MEETING

Date: November 25-30, 1979
Place: Atlanta, GA
Sponsor: Radiological Society of North America (RSNA)
Requests for Information: Ms. A. Swenson, RSNA, Suite 1150, Oak Brook Regency Towers, 1415 W. 22nd St., Oak Brook, IL 60521
Content: Topics will include diagnostic radiology, therapeutic radiology, nuclear medicine, ultrasound, pediatric radiology, neuroradiology, physics, cardiovascular radiology, and radiobiology

NATIONAL TELECOMMUNICATIONS CONFERENCE

Date: November 27-29, 1979
Place: Washington, DC: Shoreham-Americana Hotel
Sponsor: IEEE--Communications Society and Washington Section
Requests for Information: J. N. Birch, Dept. of Defense, 3311 Marlborough Way, College Park, MD 20740
Content: Topics will include electromagnetic compatibility, frequency standards and utilization, government regulation, microwave theory and techniques, and radio communication

FOURTH INTERNATIONAL CONFERENCE IN INFRARED AND NEAR-MILLIMETER WAVES

Date: December 10-15, 1979
Place: Miami Beach, FL: Americana Hotel
Sponsor: IEEE Society on Microwave Theory and Techniques, IEEE Quantum Electronics and Applications Society, International Union of Radio Science (URSI)
Requests for Information: K. J. Button, MIT Natl. Magnet Lab., Cambridge, MA 02139

Content: Topics will cover work concerned with near-millimeter wave and infrared theory, techniques, devices, systems, spectroscopy, and applications

Selected Bibliography of Papers to be Presented:

THE LOW FREQUENCY NORMAL MODES OF NUCLEIC ACIDS AND RELATED COMPOUNDS. G. Ascarelli, E. Prohovsky

NONTHERMAL RESONANT BIOLOGICAL RESPONSE TO MICROWAVE IRRADIATION. F. Kellmann

LATTICE MODES OF HYDROGEN-BONDED CRYSTALS. A. Novak

RESONANCE RAMAN SEPCTROSCOPY OF BIOLOGICAL MOLECULES. A. Mayer, W. Dreybrodt

INTERNATIONAL RADIATION PROTECTION ASSOCIATION: FIFTH INTERNATIONAL CONGRESS

Date: March 9-14, 1980
Place: Jerusalem, Israel: Jerusalem Convention Center
Sponsor: Israel Health Physics Society; International Radiation Protection Assoc. (IRPA)
Requests for Information: Israel Health Physics Society, c/o Soreq Nuclear Research Center, Yavne 70600, Israel
Content: Sessions will cover all aspects of protection against ionizing and nonionizing radiation

5TH INTERNATIONAL CONFERENCE ON INFRARED AND MILLIMETER WAVES

Date: December 8-12, 1980
Place: Wurzburg, West Germany
Sponsor: Inst. of Electrical & Electronics Engineers (IEEE)--Microwave Theory & Techniques Society
Requests for Information: K. J. Button, MIT Natl. Magnet Lab., Cambridge, MA 02139
Content: Will include session on biologic effects of electromagnetic radiation