



Project Summary

Potential Human Study Populations for Non-Ionizing (Radio Frequency) Radiation Health Effects

Lawrence C. Novotney and Inara Gravitis

This research project was initiated to identify potential human populations for future epidemiological studies of the health effects of non-ionizing radiation.

Through a literature search and contacts with various groups and organizations, numerous occupations and applications of radio frequency radiation (RFR) were identified and evaluated for their suitability for more detailed study. Many populations were eliminated early because their potential exposure to RFR was too limited or the data necessary for epidemiological research was unavailable. Eight potential study populations were identified: RF heat sealer operators, HF (high frequency) tube welder operators, medical diathermy operators in Veterans Administration hospitals, medical diathermy operators in rehabilitation facilities, children attending schools located near broadcasting towers, state policemen, security guards, and radar technicians. The eight populations were evaluated in greater detail, appear to satisfy many of the criteria for epidemiological research, and could be useful study groups in an investigation of the health effects of non-ionizing radiation.

This Project Summary was developed by EPA's Health Effects Research Laboratory, Research Triangle Park, NC, to announce key findings of the research report that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Very few epidemiological studies have been conducted on the biological effects of microwaves, but many clinical studies from Eastern European countries report a number of symptoms associated with microwave exposure. Most of the reported symptoms involve functional disturbances of the central nervous system such as headache, irritability, loss of appetite, fatigue, depression and emotional instability, symptoms that are generally reversible if the exposure to microwaves is discontinued. Functional cardiovascular changes such as alterations in cardiac rhythm and blood pressure have also been reported.

The few epidemiological studies performed in the United States did not report any deleterious effects attributable to microwave exposure. The principal groups studied were comprised of persons occupationally exposed in the military or industry. The problems associated with most of these earlier studies include a small number of individuals studied, inadequate control groups, and poorly defined exposure data. This study identifies and characterizes human populations for possible future use in epidemiological studies on the health effects of exposure to RFR.

Materials and Methods

In order to identify all possible applications of RFR, a literature search was undertaken initially. As applications were

identified, additional information was obtained about them from groups such as trade and professional associations, labor unions, equipment manufacturers, organizations representing industries, and users of radio frequency (RF) devices.

While this information was being gathered, a set of criteria was developed to evaluate each application and potential population. The criteria were as follows:

1. Sample size A minimal sample size of 200 was arbitrarily decided upon, since it was thought that the likelihood of conducting a study and identifying a biological effect with a smaller sample would be low.
2. Availability of exposure data, including type of device, frequency, and ability to measure or estimate exposure.
3. Availability of personal data including occupational/personnel data and medical records or other health status indicators.
4. Availability of a suitable control group.
5. Evidence of intent to cooperate in an epidemiological study.

The populations identified as potentially exposed to RFR were then evaluated according to the established criteria to determine their suitability for future epidemiological studies.

Results and Conclusions

Through the processes of literature search and contact with those concerned with RFR, an initial list of nearly 50 applications was developed. These applications were evaluated for their potential as populations for future epidemiological studies. Eventually, eight diverse populations with acceptable attributes to varying degrees were selected for possible use in future studies. The suitability of each group for use in future studies would depend upon the biological end points to be studied as well as on the characteristics of the group itself.

The eight groups and their distinguishing characteristics are listed below:

- | | | |
|---|---|--|
| <ol style="list-style-type: none"> 1. Sample size A minimal sample size of 200 was arbitrarily decided upon, since it was thought that the likelihood of conducting a study and identifying a biological effect with a smaller sample would be low. 2. Availability of exposure data, including type of device, frequency, and ability to measure or estimate exposure. 3. Availability of personal data including occupational/personnel data and medical records or other health status indicators. 4. Availability of a suitable control group. 5. Evidence of intent to cooperate in an epidemiological study. | <ol style="list-style-type: none"> 2. High Frequency (HF) Tube Welder Operators <ol style="list-style-type: none"> a. Most facilities unionized (Union health clinics and records) b. Cooperation probable 3. VA Hospital Physical Therapists <ol style="list-style-type: none"> a. Generally documented exposures b. Standard medical and personnel records c. VA cooperation probable 4. Physical Therapists in Rehabilitation Facilities <ol style="list-style-type: none"> a. Generally documented exposures b. Employee health clinics 5. Children Attending Schools near Broadcast Towers <ol style="list-style-type: none"> a. Environmental exposure b. Generally documented exposures c. A variety of parameters for possible consideration d. Potential for public concern and interest 6. State Police Officers <ol style="list-style-type: none"> a. Large and stable population b. Generally documented exposures c. Complete work and medical histories | <ol style="list-style-type: none"> d. Records standardized within a state e. Potential for long-term exposure studies 7. Security Guards <ol style="list-style-type: none"> a. Large population b. Documented exposure c. Potential for long-term exposure studies 8. Radar Technicians <ol style="list-style-type: none"> a. Large population b. Interest and support indicated by FAA and unions c. Standardized records and equipment |
|---|---|--|

The use of any one of the eight identified populations has disadvantages as well as advantages for particular types of studies. The selection of the best population for an epidemiological study depends on the priorities in question, the desired study emphasis (environmental or occupational), the types of exposure of greatest concern, considerations about time and money, and the public policy and environmental health issues of greatest concern.

Lawrence C. Novotney and Inara Gravitis are with JRB Associates, McLean, VA 22102.

Charles G. Liddle is the EPA Project Officer (see below).

The complete report, entitled "Potential Human Study Populations for Non-ionizing (Radio Frequency) Radiation Health Effects," (Order No. PB 83-147 447; Cost: \$14.50, subject to change) will be available only from:

*National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650*

*The EPA Project Officer can be contacted at:
Health Effects Research Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711*

1. RF Plastic Heat Sealer Operators
 - a. Very large population
 - b. Generally documented exposures
 - c. Limited study undertaken by NIOSH (some information and measurements taken and cooperation probable)

United States
Environmental Protection
Agency

Center for Environmental Research
Information
Cincinnati OH 45268

Postage and
Fees Paid
Environmental
Protection
Agency
EPA 335



Official Business
Penalty for Private Use \$300

PS 0000329
U S ENVIR PROTECTION AGENCY
REGION 5 LIBRARY
230 S DEARBURN STREET
CHICAGO IL 60604