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COMAR Reports

USE OF "PROTECTIVE DEVICES" FOR CELLULAR TELEPHONES

TECHNICAL INFORMATION STATEMENT

The Institute of Electrical and Electronics Engineers – Engineering in Medicine and Biology Society (IEEE EMBS) Committee on Man and Radiation (COMAR) acknowledges public concern about the safety of exposure to radio frequency (RF) energy from mobile telephone handsets.

Mobile phone handsets are low-powered radio transmitters, and some of the energy they transmit is absorbed in the body of the user.

A number of devices on the market purport to shield or protect users from this energy. The devices vary widely in design. Some devices are intended to be worn by the user, or kept around the user's house, and are claimed to "neutralize" effects of RF energy on the body. Other devices are to be used with the handset, and are claimed to reduce the user's exposure to RF energy.

The following Technical Information Statement comments on the usefulness of these devices, both for reducing exposure to RF energy and for providing possible health benefits to the user of mobile telephones.

1. Standards or guidelines for human exposure to RF energy have been developed by professional organizations and government agencies in the United States and elsewhere [1-5]. These limits are designed to protect against all known hazards of RF energy exposure, with large built-in margins of safety.

Handsets sold by major manufacturers are designed to comply with these international limits. Thus, devices that claim to reduce exposure to RF energy further below these limits provide no scientifically accepted benefit to health or safety, even if they actually do reduce exposure.

2. A number of devices on the market claim to reduce RF exposure to the user. The devices vary widely in design. Some consist of "hands-free" kits that move the handset away from the user's head. Others consist of devices that are to be attached to the handset or its antenna.

Apart from any health benefits they may claim, the effectiveness of many of these devices in reducing exposure to the user is negligible or remains unproven. The Federal Trade Commission has issued a "Consumer Alert" warning that claimed health benefits are not supported by scientific evidence [6].

3. Determining a user's exposure to RF energy from a mobile handset is a complex matter calling for specialized equipment and techniques. The scientifically accepted measure of exposure is the Specific Absorption Rate (SAR), the rate of energy absorption in tissue, measured in watts per kilogram of tissue.

The tests, using a model of the human head, must be done under controlled conditions and using standardized procedures. Three international standards-setting bodies (IEEE, IEC, and CENELEC) have worked together to develop valid measurement procedures that are consistent across several countries. Measurements that do not follow these procedures will be hard to interpret and are likely to be unreliable.

Both a handset's design and the power at which it operates can affect the SAR. Handset power is regulated by the nearby base station and can vary from moment to moment. It is normally set at the lowest level at which the handset can effectively communicate with the network. This feature, called adaptive power control, is *not* measured in standard tests of SAR, which are conducted at full handset power to determine worst-case exposures.

Because of adaptive power control, a handset normally operates at less than maximum power, if the signal from the base station if sufficiently strong. Any protective device that interferes with communication between the handset and the base station may cause the handset to *increase* its output. In other words, a protective device might actually increase the user's exposure to RF energy, over what it would have been had it not been used at all.

Any valid test of the effectiveness of a device in reducing a user's exposure to RF energy must include two components: (a) a valid measurement of SAR with the handset operating at a constant power level, with and without the device in place; and (b) a procedure that can detect any changes in the effectiveness of communication between the handset and the base station that might result from use of the device.

4. Few if any vendors of protective devices have reported adequate tests of the effectiveness of their devices in reducing RF exposure to the user. Independent tests on a number of such devices show them to be ineffective in decreasing exposure [7] [8].

5. Vendors of some protective devices have reported *biological* tests to support health claims for the devices.

Amassing evidence to support a health claim is a complex matter, and the validity of such tests demands careful examination in the context of the larger literature on this subject. Therefore, a user should not assume that biological tests conducted using handsets and protective devices have any scientific validity or any significance for human health and safety.

6. "Hands-free kits" are widely available, in some cases provided by the manufacturers of mobile phones. Appropriate tests have shown that these devices *are* effective in reducing RF to the head [9] (although if the handset is worn near the body, they may increase exposure to other parts of the body). In addition, such devices do not require a user to hold the handset during use, so they also add convenience.

5. If a mobile-phone user wants to reduce his or her exposure to RF energy, for whatever reason, he or she can:

- limit the duration of calls
- use a digital handset instead of an older analog model. In most, but not all cases, digital handsets operate at lower power levels than analog models. (The actual power level, however, depends on local conditions and can vary greatly.)
- use "hands-free kits", which move the handset away from the body.

6. Traffic safety is an important issue related to mobile-phone use. A study reports that using a mobile telephone increases a driver’s risk of having an accident [10]. For this reason, the use of mobile phones by drivers is illegal in many places. However, present evidence does not indicate any reduction in risk of traffic accidents through use of a hands-free kit.

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This statement was prepared by the IEEE EMBS Committee on Man and Radiation (COMAR) with significant contributions from the following: Kenneth R. Foster, C.-K. Chou, P. Riu. It has been reviewed by the members of COMAR and outside experts, all of whom have expertise in the general area of the interactions of electromagnetic fields with humans. This final report was approved by vote of the full COMAR membership and by the IEEE EMBS Executive Committee.