THE IMPORTANCE OF ANIMAL STUDIES IN UPCOMING HAZARD EVALAUATIONS OF RADIOFREQUENCY EXPOSURE

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With the rapid proliferation of mobile phones and wireless local-area, personal-area, and broadband technologies in our society, coupled with an increasing awareness of health-related issues, an element of concern has been raised by some regarding potential adverse effects of long-term low-level radiofrequency (RF) exposure. In an effort to address this concern, the World Health Organization (WHO) has taken the lead in developing a research agenda and literature database (http://www.who.int/peh-emf/en/). This literature database will be a major source for hazard evaluations, such as one scheduled by the International Agency for Research on Cancer (IARC) in 2006 to determine whether long-term low-level RF exposure is carcinogenic. A similar evaluation is scheduled for 2006 / 2007 by WHO to determine if RF exposure is associated with any non-cancer health endpoints. The hazard evaluation process generally assigns principal weight to epidemiologic studies and secondary weight to animal bioassays. In vitro studies generally play a supportive role to elucidate mechanisms of established physiological endpoints. The weight of any individual study also depends upon demonstration of independent verification in a separate laboratory under similar conditions, especially if the results deviate or contradict the weight of evidence in the literature. When epidemiologic data is either unavailable, or is not completely definitive due to limitations in exposure assessment or inadequacies in design, a corresponding degree of weight often shifts towards available animal bioassays in the hazard evaluation process. Although a number of gallantly designed epidemiologic studies have been performed to assess correlations between adverse human health endpoints and exposure to mobile phones or occupational / general public RF sources, there are a number of unavoidable factors associated with these studies that challenge a completely definitive interpretation of the results. First, reconstructing individual RF dose from constantly changing sources over an extended period of time is exceedingly complex, depending not only on a subject\'s pattern of use and/or location, but upon many additional factors associated with the specific RF technology. In addition, the relatively limited length of time that most individuals in our society have been routinely exposed to many RF technologies may be exceeded by the typical latency period of the adverse endpoints examined, for instance brain tumors. Finally, with no preliminary findings or obvious mechanism to indicate a specific physiologic target of low-level RF exposure, it is difficult to ascertain whether a study has been designed sufficiently to detect every possible adverse health endpoint(s), especially those that may be veiled and obscure. It is important to note that current epidemiologic data is still of great value, and these complexities do not negate the primary contribution these studies make to the current literature database. However, these issues emphasize the role that studies of well characterized and higher exposure levels in laboratory animals over substantial portions of their lifetime will also play in upcoming hazard evaluations. The following paper summarizes the results of 30 published animal bioassays contained in the current literature database.