It is noteworthy that there is agreement in studies where higher SARs are induced by microwave exposure. Several studies from our laboratory have been demonstrated that when the SAR is sufficiently high (165 W/kg or more) that it could raise the temperature of the brain to 42°C or higher, BBB permeability increases for substances normally excluded from brain parenchyma [Lin and Lin, 1982; Goldman et al., 1984; Neilly et al., 1986]. These results are consistent with previous studies showing microwave hyperthermia induced disruption of BBB [Sutton and Carroll, 1979; Moriyama et al. 1991]. This conclusion is also supported by a study showing heating of the rat's brain by conventional means caused disruption of the blood-brain barrier [Merritt et al., 1978].

Cataractogenic and Other Effects of Microwave Exposure on the Ocular System

A common concern that is often expressed about microwave radiation is the formation of cataracts. The production of lens opacities in the eyes of laboratory animals following acute microwave exposure is well-established. It is generally accepted that acute exposure to higher levels of CW radiation causes various degrees of lens opacification in laboratory animals at many microwave frequencies [Carpenter and van Ummerson, 1968; Kramar et al., 1975; Guy et al., 1975]. However, the exact conditions under which these changes may occur in human beings are a subject of debate [Lin, 1979; Michaelson and Lin, 1987]. This section will present a review of findings reported for laboratory animals (See **Table 11**). A summary of human studies is given in the **Epidemiology and Human Studies** section to follow.

Studies on the effect of microwave radiation on the ocular system were initiated soon after the introduction of radar in World War II. These investigations have established a time and power threshold for cataractogenesis in animals exposed to near-field microwave radiation (See **Figure 2**) [Carpenter and van Ummerson, 1968; Kramar et al., 1975; Guy et al., 1975]. One of the most intensively investigated frequency is 2450 MHz, which is in the same frequency band (2400-2483 MHz in North America and Europe; 2470-2499 MHz in Japan) for some wireless local area networks (WLANs). For rabbits exposed to near-field 2450 MHz CW microwaves, it has been shown that the minimum cataractogenic power density is 150 mW/cm^2 for 100 min which produces a maximum SAR of 138 W/kg in the vitreous body [Guy et al. 1975]. A retrolental temperature above 41°C was necessary for production of lens opacities in these rabbits. The appearance of maximum temperature near the posterior capsule of the lens agreed with the observation that the peak SAR in the eye was also just behind the lens. The maximum temperature in the eye for various ambient, orbital, and microwave exposure conditions have been predicted by finite element computer modeling as well [Emery et al. 1975]. It is also interesting to note that when the retrolental temperature are kept from exceeding 41°C by means of whole body hypothermia a single, potentially cataractogenic microwave exposure would not produce opacity in the lenses of rabbits [Kramar et al., 1975]. These results support the notion of a thermal mechanism for microwave cataractogenesis.

There is, however, considerable argument whether heat is the only factor, and whether chronic exposure to pulse modulated radiation of low average power is significant in the