The generally accepted explanation is that the microwave hearing effect does not arise from an interaction of microwave pulses directly with the auditory nerves or neurons at higher nuclei along the auditory pathway. Instead, the current understanding is that the microwave pulse, upon absorption by soft tissues in the head, initiates a thermoelastic wave of acoustic pressure that travels by bone conduction to the inner ear and activates the cochlear receptors via the same mechanism for normal hearing [Lin, 1977, 1978, 1980, 1990; Chou et al., 1982]

There is little data regarding the effect on the middle and inner ears' hearing apparatus or the central nervous system from exposure to these microwave pulses. It is clear that threshold microwave auditory response would have an insignificant effect on the hearing apparatus [Lin, 1990]. However, any health effect that may attend exposure to pulsed microwave radiation over a prolonged period of time or exposure to suprathreshold microwave pulses has not been investigated systematically. The current research using RF radiation from mobile telephone operations may provide some insight in this regard. In addition, the effect of extremely high peak power microwave pulses has recently been initiated using laboratory animals at 1.25 GHz for body movement response [Brown et al., 1994] and at 5.62 GHz for operant behavioral response [D'Andrea et al., 1994]. The microwave energy involved in these high peak power microwave studies are several orders of magnitude greater than the threshold for auditory sensation. As more data accumulates from these and other studies, we should be able to gain a better understanding of effects on the central nervous system from high peak power microwave pulse radiation [Lin, 1989].

Neurophysiological Effects

The effects of CW radiation on the nervous system have been studied extensively. Investigations have included electrophysiological studies of central and peripheral nervous structures (See **Table 9**). Alterations in central nervous system functions have been demonstrated using 918 and 2450 MHz radiation. The studies have employed microelectrodes stereotaxically implanted in the brain of anesthetized cats and signal averaging techniques. These effects appeared as a decreased latency of auditory and tactile evoked thalamic responses, and they occurred typically when the maximum local SARs in the irradiatted brain tissue are 5 W/kg or higher and are sufficient to cause a 0.5°C temperature rise [Guy et al., 1975]. These observations have led to the hypothesis that reduction in latency of evoked potential resulting from CW microwave irradiation of the head is due to tissue heating. This interpretation is reinforced by experiments where the microwave-induced thalamic evoked potential latency changes were found to be identical to those attending conventionally conducted heating of the brain structure; furthermore, the central nervous system changes resulting from microwave irradiation can be eliminated or reversed with concurrent cooling of the affected neural (thalamus) tissue [Taylor and Ashleman, 1975]. A more detailed discussion of neurological effects of RF and microwave fields is found in Chapter 2 of Volume 1 in this series.

Table 8. Microwav

Frequency PPS (Hz)	Puls Wid
(MHz)	(10
1245 MHz	10-
1310 MHz 200 Hz	
2450 3/10 Hz	1.0
3000 MHz 200 Hz	
3000 MHz	15

Note: At 915 and

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from the brain c