

Table 14. A comparison of biological thresholds, SARs, and permissible exposure limits for wireless communication frequencies.

Effect	SAR Threshold (W/kg)	SAR Head (W/kg)	SAR ¹ Limit (W/kg)	Duration (min)	SAR ² Limit (W/kg)	Duration (min)
Auditory	1.6-48	0.44-3.6*	8.0	6	1.6	30
BBB	2-80	0.54-2.3 [®]	8.0	6	1.6	30
Cancer	2-6	0.44-3.6	8.0	6	1.6	30
Nerve	6.8-81	0.54-2.3	8.0	6	1.6	30
Epidemiology	--	--	8.0	6	1.6	30

¹Controlled environment; ²Uncontrolled environment; *Measured or [®]computed for handset antennas.

In summary, our knowledge regarding the biological effects of RF radiation have been on the increase for many decades. It has become a focal point of attention because of the accelerated use of RF radiation for wireless communication over the past few years. As noted earlier, it is fairly well established that at sufficiently high power levels, RF and microwave energy can produce deleterious biological effects. Wireless communication systems use low power modulated forms of RF and microwave radiation that were not investigated extensively in the past. The threshold for some biological effects reported to occur at low SAR or at constant system temperature or at no measurable elevation of tissue temperature is given in Table 14. Computed and measured SARs within head models irradiated by typical mobile telephone handset antennas are provided together with ANSI/IEEE guidelines for permissible exposure. It can be seen that the thresholds and SARs both vary greatly. Clearly, many specific questions must be answered before any consistent, dependable and scientific conclusions can be drawn for the health and safety of wireless mobile communication systems. Nevertheless, these thresholds and SARs are within the same range as the exposure guidelines. Given the uncertainties and the fact that thresholds are conservative estimates for minimal biological effects to occur at a specific SAR, available data do not suggest any immediate cause for concern of a impending threat to the health of the population from acute or short term exposure to low level RF and microwave radiation.

Investigations to answer some of the questions have already begun. Many of them are

designed to study the irradiation, the possible confirmed evidence epidemiological in communication and radiation over time. RF radiation and biological progress has been made in distribution in and large populations. animal experiment.

The emphasis should be noted that energy for biomedical and benign prostate Huang, 1995; Lin, applications are: the rewarming of frozen Lin et al., 1995, 1

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