

Biomaterials 2020: Headband to protect head from EM pollution using electromagnetic shielding material

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The present application relates to a method and System for reducing the exposure of the human head to electromagnetic radiation resulting from the use of a hands cellular phone or other radio communications device. An antenna of a cellular phone is known as a EM radiation emitter, and various Systems exist to protect users from exposure to EM radiation emitted from the antennae of cellular phones. One method for reducing the exposure of users of cellular phones to EM radiation is the use of an EM Shield around the antenna. Other known method for reducing the exposure of users of cellular phones is to distance the antenna of the phone from the user's head when the phone is in use the phone with its antenna in a docking compartment remote from the user and additionally provides an EM shield for the docking compartment. Distancing the telephone from the user requires either a speaker phone or a headset. Since the use of Speaker phones destroys the privacy of the conversation and may annoy others in the vicinity, a headset is often preferred .A headset, i.e., a device which includes a speaker designed to be worn in the ear cavity of or adjacent to the ear while the phone is in use, allows the user to carry the phone and associated antenna Some distance away from the head, e.g., on a belt, and reduces the intensity of the EM radiation reaching the ear from the antenna. However, it does not eliminate the exposure of the user to the EM radiation emanating from the headset Speaker and/or the electrically conducting wire connecting the Speaker to the cellular phone. Moreover, locating the Speaker of the headset in or immediately adjacent to the ear cavity places a Source of the EM radiation in the place that allows maximum EM radiation exposure to the brain.

It is accordingly an object of the paper to provide a novel method and System for reducing the potential injury from EM radiation to the user of a radio communications device. EM shielded components for a radio communications device which may be used individually or in combination to decrease the risk of injury from electromagnetic radiation. Electromagnetic (EM) wave is the transport of energy into waves by the effect of perpendicular electric and magnetic fields. These waves propagate at the speed ($c=300\ 000$ km/sec). EM waves have three important characteristics, frequency (f), period (t) and wavelength (λ). The path traveled by a wave in a period gives the wavelength (λ) and the unit is metric ($mc=\lambda$ and $\lambda = c/f$). EM waves are classified according to the wave shape, frequency, and the energy they carry as radio waves, microwaves, visible lights, ultraviolet rays, infrared rays, x rays and gamma rays as can be seen. Depending on the duration and intensity of exposure to the EM field, these fluctuations can cause serious health problems for adults, children and particularly infants. Mobile phones affect human health negatively. Anyone who uses mobile phones or is in the same environment is exposed to this effect. Most studies of cellular phone use have failed to find an overall association with risk of tumors, but several suggest an increased risk among those who started use 10 years or more in the past, particularly for ipsilateral use. Sadetzki study reported significant positive associations between high cumulative exposure to cellular phones and ipsilateral tumors, rural or mixed rural/urban residence, and parotid gland tumors.