

# Radio waves and health

## Standards and limits

*International standards specify limits for exposure to radio waves from mobile telephones and radio base stations. The limits are based on many years of research and include wide safety margins.*



In order to ensure that exposure to radio waves does not cause adverse health effects, international guidelines and standards have been developed. Many countries have adopted the guidelines from ICNIRP (International Commission on Non-Ionizing Radiation Protection), which is an independent scientific organization formally recognized by the World Health Organization (WHO).

Research on health effects of radio waves has been going on for many decades and several thousand studies have been published. This large amount of research forms the basis for the ICNIRP guidelines. The prescribed limits incorporate large safety margins, which means that they have been set far below the exposure levels at which any health effects have been found.

In the frequency range used by mobile telephony the ICNIRP limits are specified as *Specific Absorption Rate* (SAR) levels. SAR is a measure of the uptake of radio wave energy in the body and it is expressed in terms of watts per kilogram (W/kg). For mobile phones that are used close to the head or body the maximum SAR should not exceed the

limit 2 W/kg averaged over 10 grams of tissue (or 1.6 W/kg over 1 gram, in the USA and some other countries). International technical standards specify how SAR should be measured. Before a new mobile phone model is introduced in the market, it must have been SAR tested and shown to operate within the limits.

SAR is difficult or impossible to measure in many situations. Therefore ICNIRP also specifies additional reference levels, which allow for measurements of the intensity of the radio waves in air. For example the reference levels are 4.5 W/m<sup>2</sup> at 900 MHz (GSM) and 10 W/m<sup>2</sup> at 2100 MHz (3G). An exposure level below the reference levels assures that the SAR limits are met. The reference levels are normally used to show that the radio wave exposure from a base station is in compliance with the limits. International technical standards describe how such measurements should be performed.

For more information, visit <http://www.ericsson.com/health>.