Personal RF-EMF exposure of Swiss adolescents

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The HERMES (Health Effects Related to Mobile PhonE use in adolescentS) study, a cohort study conducted in Central Switzerland, aims to prospectively investigate whether the exposure to radio frequency electromagnetic fields (RF-EMF) emitted by mobile phones and other wireless communication devices affects cognitive functions or causes behavioural problems and non-specific health disturbances in adolescents. For investigating effects of RF-EMF in epidemiologic studies the exposure assessment is a crucial part. In the framework of the HERMES study personal RF-EMF measurements in 95 adolescents were conducted. The adolescents carried an exposimeter, a portable measurement device, for on average 2 days and 8 hours. Additionally they filled in a time-activity diary installed as an application on a smartphone in flight-mode and GPS was continuously recorded by the smartphone. The used exposimeter Expom measures 13 frequency bands ranging from DVB-T (Digital Video Broadcasting – Terrestrial, centre frequency of 620 MHz) to WiMax (Worldwide Interoperability for Microwave Access, 3500 MHz). These measurements allowed describing the RF-EMF exposure in everyday life of Swiss adolescents.

Overall the total RF-EMF exposure over the whole measurement period was on average 0.069 mW/m². Highest exposure was measured for the uplink (transmission from mobile phone handsets to mobile phone base stations) exposure with on average 0.047 mW/m², followed by downlink (transmission from mobile phone base stations to mobile phone handsets) with 0.013 mW/m², exposure from broadcast transmitters with 0.004 mW/m², WLAN (Wireless Local Area Network) with 0.002 mW/m² and DECT (Digital Enhanced Cordless Telecommunications) with 0.0004 mW/m². Regarding different activities and locations the adolescents' exposure was highest when spending time in public transport and cars (0.940 mW/m² in cars, 0.753 mW/m² in trains and 0.696 mW/m² in buses). The exposure outside was 0.142 mW/m² and the lowest exposures where measured in school (0.056 mW/m²) and at home (0.028 mW/m²).

In conclusion other people's mobile phones and mobile phone base stations contribute most to the total exposure and adolescents are highest exposed when travelling in public transport and in cars.