

## Publication

## A prediction model for personal radio frequency electromagnetic field exposure

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Radio frequency electromagnetic fields (RF-EMF) in our daily life are caused by numerous sources such as fixed site transmitters (e.g. mobile phone base stations) or indoor devices (e.g. cordless phones). The objective of this study was to develop a prediction model which can be used to predict mean RF-EMF exposure from different sources for a large study population in epidemiological research. We collected personal RF-EMF exposure measurements of 166 volunteers from Basel, Switzerland, by means of portable exposure meters, which were carried during one week. For a validation study we repeated exposure measurements of 31 study participants 21 weeks after the measurements of the first week on average. These second measurements were not used for the model development. We used two data sources as exposure predictors: 1) a questionnaire on potentially exposure relevant characteristics and behaviors and 2) modeled RF-EMF from fixed site transmitters (mobile phone base stations, broadcast transmitters) at the participants' place of residence using a geospatial propagation model. Relevant exposure predictors, which were identified by means of multiple regression analysis, were the modeled RF-EMF at the participants' home from the propagation model, housing characteristics, ownership of communication devices (wireless LAN, mobile and cordless phones) and behavioral aspects such as amount of time spent in public transports. The proportion of variance explained ( $R^2$ ) by the final model was 0.52. The analysis of the agreement between calculated and measured RF-EMF showed a sensitivity of 0.56 and a specificity of 0.95 (cut-off: 90th percentile). In the validation study, the sensitivity and specificity of the model were 0.67 and 0.96, respectively. We could demonstrate that it is feasible to model personal RF-EMF exposure. Most importantly, our validation study suggests that the model can be used to assess average exposure over several months

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