

Novel Whole-body and Localized Exposure Systems to Investigate Human Biological Effects for 5G and Beyond Wireless Systems

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In the revised international guidelines for the protection of humans from electromagnetic fields, the specific absorption rate (SAR) for whole-body exposure has been extended from 3 or 10 GHz to 300 GHz. The rationale for this revision is the extrapolation of findings from conventional radiofrequency exposure as well as infrared radiation. However, only a few studies conducted have been conducted for whole-body exposure experiments in humans at frequencies below 6 GHz. Biological evidence is needed to verify the rationale of the guidelines. In particular, it is imperative to accumulate evidence for 5G millimeter wave (MMW) exposure due to its rapid expansion. In addition, it is known that 5G-MMW is mainly absorbed in the superficial tissues of the body. Thus, the focus should be on the direct effects of exposure on skin tissue or indirect effects on other physiological responses through the skin. Several research groups investigated the biological effects of exposure to MMW, mainly in the eye and in cultured cells. In contrast, there is little information about the effects on the human body surface, including the regulation of skin blood flow or sweating. In addition, the physiological responses to the different intensities or signal modulation of exposure are still unclear.

In order to assess the thermal threshold for MMW exposure, it is necessary to measure the time course of the biological response during exposure. We developed exposure system for whole-body and localized exposures to obtain these physiological data under MMW exposure. We then measured the human skin surface temperature, blood perfusion, core temperature, etc.. In this presentation, we will introduce these novel exposure systems, as shown in Fig.1, and then present preliminary results of computational dosimetry, measured temperature rise in human skin during MMW exposure.

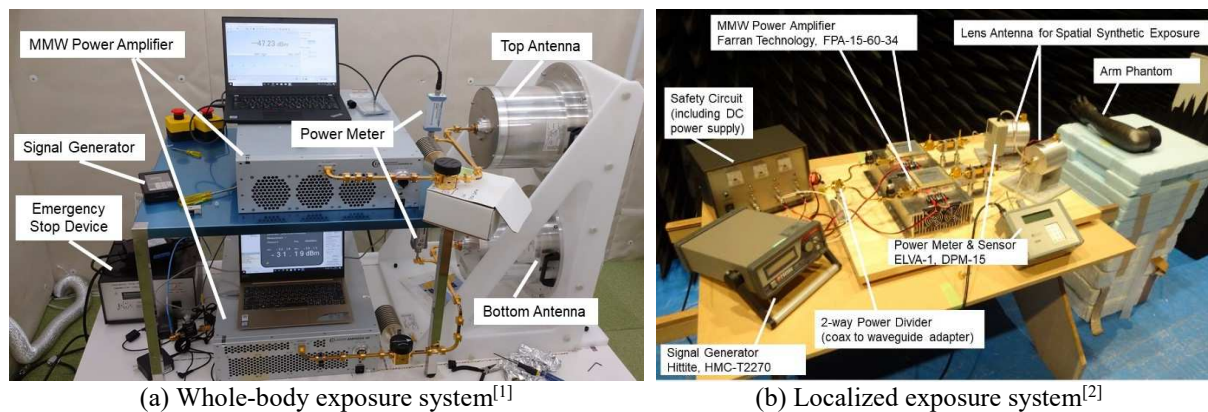


Figure 1. Overview of the developed exposure systems

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References

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