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Title:In vivo terahertz imaging of rat skin burns
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Abstract:A reflective, pulsed terahertz (THz) imaging system was used to acquire high-resolution (d₁₀₋₉₀/ λ~1.925) images of deep, partial thickness burns in a live rat. The rat's abdomen was burned with a brass brand heated to ~220°C and pressed against the skin with contact pressure for ~10 sec. The burn injury was imaged beneath a Mylar window every 15 to 30 min for up to 7 h. Initial images display an increase in local water concentration of the burned skin as evidenced by a marked increase in THz reflectivity, and this likely correlates to the post-injury inflammatory response. After ~1 h the area of increased reflectivity consolidated to the region of skin that had direct contact with the brand. Additionally, a low reflecting ring of tissue could be observed surrounding the highly reflective burned tissue. We hypothesize that these regions of increased and decreased reflectivity correlate to the zones of coagulation and stasis that are the classic foundation of burn wound histopathology. While further investigations are necessary to confirm this hypothesis, if true, it likely represents the first in vivo THz images of these pathologic zones and may represent a significant step forward in clinical application of THz technology.
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Uncontrolled terms:in-vivo terahertz imaging - rat skin burns - reflective pulsed terahertz imaging system - high-resolution image acquisition - rat abdomen - burn injury - Mylar window - local water concentration - THz reflectivity - post-injury inflammatory response - highly reflective burned tissue - coagulation - burn wound histopathology - clinical application
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