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CORRESPONDENCE

A novel combined thermography and clinical joint assessment approach discriminates ultrasound-detected joint inflammation severity in rheumatoid arthritis at more joint sites compared to thermography alone

Rheumatoid arthritis (RA) is the most common autoimmune inflammatory arthritis with a world-wide prevalence of about 1%.[1] Despite therapeutic advances, many RA patients still do not respond adequately to treatment, remaining "difficult to treat".[2] New models of care incorporating modern musculoskeletal imaging may offer better assessment of joint inflammation,[3] and help guide treatment decisions as rheumatologists strive toward improved RA patient care through early disease diagnosis, better disease prognostication and monitoring of treatment response.[4] A recent systematic review[5] highlighted the growing interest in the use of thermography for the evaluation of inflammatory and degenerative joint diseases based on the publication trend in the last decade. With technology advancement, thermal cameras are now more sophisticated and compact, with portable machines offering improved spatial resolution and sensitivity of thermal sensors.[6] The rapid image acquisition allows for a fairly quick assessment and an objective evaluation of skin surface temperature overlying the target joint site(s) which can be conveniently performed in the setting of the doctor's office. Recently, a novel combined thermal and ultrasound imaging approach in RA was shown to

Thermography was performed using a high-performance portable FLIR T640 thermal camera with predefined emissivity value of 0.98 for skin,[9] thermal sensitivity of <30 milli-Kelvin (mK) at 30°C and 640×480 pixel resolution. Using previously established methods,[6,9–11] thermography was performed by a designated trained research staff in the same draft-free (windowless) room with a controlled temperature of around 22°C,[11] with patients at rest for 15 minutes prior to the study to allow for acclimatization.[11] All physical objects (eg watches) obscuring the thermal camera's view had to be taken off. Each hand was placed in a neutral position on a flat table top and separately imaged with the thermal camera situated 50 cm directly above the hand. The target joint sites included the bilateral wrists, metacarpophalangeal joint (MCPJs) 1-5, thumb interphalangeal joints (IPJs) and the proximal IPJs (PIPJs) 2-5. Through the use of a regions-of-interests manual segmentation method,[10] a rectangular box was placed over each target joint site. Thereafter, at each target joint site, the maximum (Tmax), minimum (Tmin) and average (Tavg) temperature readings in °C (utilized in the published literature[6,9,10]) were recorded. Finally, the adjusted Tmax, Tmin and Tavg temperatures were derived