

Workplace Heat Stress and Hydration Management – Evidence, Technologies and Biomarkers

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ABSTRACT

Managing heat stress on the worksite is an ongoing challenge due to the combined and variable contribution of environmental conditions, physical activities and protective equipment. Recent studies have revealed that 35% of workers experience occupational heat strain, 30% report a loss of productivity due to heat stress and 15% of workers with frequent heat exposure experience kidney disease or acute kidney injury.

Physical and mental performance are dependent upon maintaining hydration and appropriate fluid intake is essential for the management of heat strain and prevention of serious injuries. While thermal risk assessments and educational initiatives are of vital importance for minimising dehydration on the worksite, there remains a need for routine and objective hydration assessment to recognise worker-specific hydration needs resulting from inter-individual variability in sweat rate, fitness and heat acclimatisation.

This talk will compare and contrast the various technologies which can be used to assess hydration, including physical symptoms, self-reported metrics and blood, saliva and urine biomarkers. Particular focus will be placed on the reliability and accuracy of urine specific gravity (USG) and salivary osmolarity (SOSM) spot-checks for hydration monitoring before, during and after shifts due to non-invasiveness and accessibility of these techniques. USG spot-checks are routinely used by many worksites, but recent research reveals that this method can greatly overestimate or underestimate the number of dehydrated individuals due to confounding effects of recent activity, diet and fluid intake on urine production. While less established for mining safety applications, SOSM spot-checks are gaining popularity after the recent introduction of point-of-care testing systems such as the MX3 Hydration Testing System.