CBD S&T CONFERENCE
TODAY'S INNOVATION, TOMORROW'S WARFIGHTER CAPABILITIES

Science of the Skin and Respiratory Tract, and Related Countermeasures Pertinent to Chemical/Biological Defense

Microneedles to Monitor Health and Human Performance

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We are exploring the prospect of using microneedles to access biomarkers for monitoring exposure to chemical and biological weapons. The development of an on-body diagnostic platform that can continuously monitor physiological markers in real-time will allow early warning capabilities that can signal an exposure event even prior to the onset of symptoms. We will present results on the development of a wearable transdermal diagnostic device to monitor lactate. A microfluidic device, based on microneedles, is being fabricated which can be worn on an individual and can painlessly access biological fluid (e.g., blood and/or interstitial fluid) through the skin for real-time, long-term autonomous diagnostics of health and fitness. From our currently sponsored DTRA project, we have developed non-destructive interstitial fluid extraction methods that do not rely on blister formation, vacuum, or microdialysis. As we avoid methods that may change the native interstitial fluid content, we have enabled studies to determine baseline correlations between interstitial fluid and blood biomarkers. We have also found that exosomes are highly prevalent in interstitial fluid and will show preliminary results for genomic and proteomic analysis of the fluid.