Warrior web to prevent injury, reduce effects of load

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Today's dismounted warfighters often carry 100 pounds or more of equipment as they patrol for hours across rugged or hilly terrain. This heavy load increases the risk of musculoskeletal injury, particularly on vulnerable areas such as knees, ankles and the spine. In addition, as loads increase, fatigue and exhaustion set in faster. DARPA seeks to develop an unobtrusive, lightweight under-suit embedded with a web of miniature sensors, functional structures and compliant actuation. The suit, for example, may automatically sense when to stiffen and relax at key body joints to help prevent injury, as well as augment the work done by muscles to help counter the negative impacts of fatigue on performance and injury.

Before a Warrior Web suit can be built, the program seeks to develop

and demonstrate technologies in five thrust areas: injury mitigation technologies; comprehensive representations of biomechanical processes; regenerative actuation technologies; adaptive sensing and control technologies; and advancements in potential suit human-to-machine interfaces. During a follow-on phase, it's anticipated an integrated suit will be developed and demonstrated.

"As the equipment load on our warriors goes up, so does the number of injuries at key body joints and soft tissues," said Army Lt. Col. Joe Hitt, DARPA's Warrior Web program manager. "The vision is to create a suit, carefully mapped to human physiology, which fits comfortably underneath the uniform and outer protective gear to provide functional and adaptive support, optimally address the dynamics of the environment, and leverage biomechanics to increase system efficiency."

According to Army officials, almost half of all soldiers who are non-deployable have suffered preventable musculoskeletal injuries.

The Warrior Web suit should ideally weigh less than 20 pounds and consume no more than 100 Watts of electric power from a battery source. The suit should have the functionality to significantly reduce the negative effects of a 100-pound load and also compensate for the weight of the suit itself.

"In addition to preventing injury and mitigating the effect of load on the wearer, the suit needs to have minimum bulk, be comfortable, address body heat and moisture, be adaptable to varying body types and maintain the wearer's natural range of motions," Hitt said.

Provided by DARPA