

Traffic Injury Prevention

The response of military lower extremity and Hybrid III leg using the Hybrid III and EuroSID-2 ATD in vertical loading impacts

Thanyani Pandelania^{a,b,c} and Dithoto Modungwaa^c

^a Landwards Science Department, CSIR: Defence and Security Cluster, Pretoria, South Africa

^b Department of Bioengineering, Imperial College London, London, UK

^c Unisa Biomedical Engineering Research Group, Department of Mechanical Engineering, School of Engineering, College of Science Engineering and Technology, University of South Africa, Pretoria, South Africa

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Abstract

Objective: Antivehicular landmines (AVLs) and underbelly improvised explosive devices (IEDs) are found to be some of the major threats for military vehicles and their occupants. Anthropomorphic test devices (ATDs) such as the 50th percentile Hybrid III (HIII) and EuroSID2-re (ES2-re) are used to assess injury caused by AVLs or IEDs in order to develop mitigation strategies by analyzing lower leg data in tibia load cells. **Methods:** This article presents the evaluation of the injury measurement response of the Hybrid III and ES2-re ATDs using both the HIII and Military Lower Extremity (MIL-LX) instrumented lower legs impacted by the Modified Lower Limb Impactor (MLLI). The MIL-LX leg tested with the HIII ATD measures higher forces than when tested with the ES2-re ATD. **Results:** In general, the MIL-LX upper tibia load cell measures peak forces that are considerably lower than that measured by the HIII lower leg with both the HIII and ES2-re ATD. The HIII leg fails earlier with both the HIII and ES2-re ATD compared to the MIL-LX leg. The study shows that the HIII and MIL-LX lower leg are not equivalent in their assessment of protective capability of armored vehicles when either attached to the HIII or ES2-re ATD. **Conclusions:** These results show the importance of selecting the correct lower leg surrogate during AVL or IED testing, which can lead to a pass or fail of the armored vehicle. These findings offer insight into the response of each surrogate lower leg with the different ATDs and can be used to develop new mitigation strategies.