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A novel CBRN PPE concept: Scalable protection and thermal strain

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Theme: Comfort and Ergonomics

Introduction

Typical chemical, biological, radiological and nuclear (CBRN) personal protective equipment (PPE) systems in use in armed forces for non-specialized units do not allow for regulation of protection. In fact, many such PPE systems meet the NATO STANAG 2352 requirements of providing 24 h of protection. That NATO standard is motivated with the Cold War in mind. However, it is recognized that the latter standard is no longer optimal and therefore a new standard is in progress (AEP-85), allowing shorter protection durations and thus new concepts to be used which meet NATO recommendations. Therefore, a layered concept was developed, allowing different levels of protection as well as thermal strain. Such concept allows for a more optimal selection of CBRN PPE balancing threat, task, and thermal environment. Here we evaluate the concept on protection and thermal strain.

Methods

Manufacturers were asked to produce prototypes of a base layer as well as a comfortable CBRN battle dress uniform (BDU), all layers based on active coal technology. Three systems were received and evaluated using Whole System Tests (also known as Man In Simulant Tests), using Methyl Salicylate as the simulant. The evaluations were carried out according to NATO AEP 38, with an exposure time of 1 h and an airflow of 4-5 m/s. The prototypes will be referred to anonymously and additional details will be given in the presentation.

Results and discussion

The results indicate that combining layers results in substantially higher protection factor than the sum of the individual layers. The results indicate that the base layer is maximally effective if the airflow is reduced by a covering layer. Additional benefits of the base layer are that they can be more tight fitting, with a correspondingly smaller microclimate than an BDU. Smaller microclimates reduce pumping effects.
