Adenovirus 4 and 7 in Military Recruit Training

Adenovirus 4 and 7 were historically the main pathogens associated with febrile respiratory illness (FRI) at military recruit centers. They were controlled by vaccine until discontinued in 1999. Between 1999 and 2011 rates were at endemic, epidemic levels. In 2011 a new Ad4/7 vaccine was introduced. A 2004 study found that virtually all recruits were immune to Ad4/7 by end of training, either having entered training as immune (1/3 of recruits) or having become immune through exposure during training. The study found adenovirus presence on living quarters surfaces, concomitant with infection and presence on hands. There was culture and PCR evidence of Ad4/7 on a variety of surfaces, from pillows to rifles. Follow-up environmental Ad4/7 studies later in 2004 and in 2007 found presence of Ad4/7 on surfaces in living quarters and in the medical clinic.

The relationship of the Ad4/7 vaccine to Ad4 and Ad7 on surfaces in the pre- and current-vaccine eras was the objective of this study.

Effect of the Ad4/7 Vaccine Since 2011

In 2011 an Ad4/7 vaccine was re-introduced to military training and has been in use since. The effect was a dramatic decrease in FRI rate.

Methods

Dacron swabs on selected surfaces in the medical clinic and living quarters were collected into UTM.

PCR was performed in studies 2004a, 2004b, and 2007, and culture was performed in studies 2004b, 2004c, and 2007. In the two post-2011 studies (2013 and 2015) only PCR was performed.

PCR methods varied by study: 2004a,b,c; restriction fragment length polymorphism analysis of purified viral DNA; 2007: agarose gel-based PCR; 2013 & 2015: universal adeno real-time PCR

Statistical analysis was done by Fisher exact tests, looking for differences between the pre-vaccination and post-vaccination studies in the proportion of positive samples, (1) including all samples tested and (2) only those surfaces included in both the pre- and post-vaccination studies.

Findings Across Studies

Percentages of Samples PCR Positive at Particular Locations, by Study


Across studies 2004b, 2004c, and 2007, culture methods did not vary, and 35 of 283 (12%) samples were positive.

Conclusion

The differences between the pre- and current-vaccination eras is significant. We believe the virus may have been completely eliminated from surfaces on the base, with virtually no known human transmission, and only a limited duration of survival on surfaces. It is, however, possible that there may yet be asymptomatic carriers on the base.

The effects of the Ad 4/7 vaccine include, beyond conferring immunological protection, interruption of transmission of adenovirus that once persisted in an environmental reservoir.