

## **The old-generation smallpox vaccines - Are we ready for the tomorrow outbreak?**

Smallpox disease has menaced the world throughout history with large scale epidemics and a case fatality rate of about 30%. Following the introduction of smallpox vaccine by Eduard Jenner in 1796, and later with the global effort to halt smallpox epidemics, the World Health Organization declared the eradication of the disease in 1980. Since then, routine vaccination gradually ceased all over the world. In Israel, childhood vaccination ceased in 1980, and revaccination of military recruits was performed until 1996. A revaccination campaign designated for first-responders was conducted between July 2002 and April 2003, leaving the majority of the population unimmunized against the disease alike other populations in the world. Although smallpox was eradicated by the end of the 1970's, it is still currently listed as a major bio-terror threat, posing a potential risk to human kind should it reemerge either from inadvertent or malicious release of existing stocks or by reconstruction of the virus in the laboratory. In case of smallpox resurgence, mass vaccination of the population would be the key step in the containment and eradication of the outbreak. The smallpox vaccine stockpiled in many countries is generally considered safe, but might cause severe adverse events in a significant percentage of vaccinees, primarily in people with eczematous skin disorders and in people with immune deficiencies. Over the last decade, renewed interest was directed at the modified vaccinia Ankara strain as an alternative to the old-generation vaccines. This new vaccine is an attenuated virus that lost its replication capability in mammalian cells and is considered to be safer than and as immunogenic as the old-generation vaccines.

Nevertheless, despite the promising results in clinical studies, the efficacy of the highly-attenuated vaccine was never tested under real circumstances, as opposed to the old-generation vaccine success in eradicating the disease worldwide. Moreover, it is more expensive than the old-generation vaccine and therefore, old-generation vaccines still play a pivotal role in the emergency plans of many countries.

The aims of our study were to estimate the proportion of Israeli adolescents at risk of severe adverse events, and to examine trends in the rate of adolescents with contraindications from 1998 to 2013.

We retrieved from the army database of adolescents screened before compulsory military service in 1998-2013, medical parameters correlating with contraindications to smallpox vaccination.

Of 1,180,964 individuals, 1.86% had vaccination contraindications in a smallpox outbreak scenario. An additional 1.24% had contraindications in a pre-event scenario- in which, smallpox stays eradicated. There was an increase in the percentage of contraindications over time, attributed to the rising incidence of atopic dermatitis in the population

In conclusion, only a small percentage of the population should not be vaccinated with the old-

generation smallpox vaccines that are currently in use in a mass vaccination campaign during a smallpox outbreak scenario. For this special group we can offer two options: either to rely on herd immunity of the other vaccinees or to purchase a relatively small amount of new generation vaccines designed to prevent severe adverse events.

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## **Publication**

[Estimated prevalence of smallpox vaccine contraindications in Israeli adolescents.](#)

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