Grant Agreement number: 115854
Action acronym: EBOVAC1
Action title: Development of a prophylactic Ebola vaccine using a heterologous prime-boost regimen

Periodic report: **2nd**
Period covered: **from** 1/1/16 **to** 31/12/16
Start date of the action: 1/12/14
Duration of the action: 60 months

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Version: 1.0

1. Summary for Publication

1.1Summary of the context and overall objectives of the action

Combining the expertise and capabilities of global research institutions, non-government organisations and the pharmaceutical industry has been critical to help address the Ebola public health challenge.

The Ebola vaccine projects – EBOVAC1, EBOVAC2, EBODAC and EBOMAN – are a series of clinical trials and associated projects which aim to assess a novel 'prime-boost' (dual shot) preventive vaccine regimen against Ebola Virus Disease (EVD).

The EBOVAC1 project is conducting clinical trials in Europe and Africa to assess the safety, tolerability and immunogenicity (immune response) of the heterologous 'prime-boost' Ebola vaccine regimen (Ad26.ZEBOV and MVA-BN-Filo) in development by Janssen Vaccines, one of the Janssen Pharmaceutical Companies of Johnson & Johnson. The vaccine regimen involves an initial dose that primes the immune system to develop disease-specific antibodies, followed by a booster dose at a later date with the goal of potentially strengthening and optimizing the duration of immunity.

1.2 Work performed from the beginning of the action to the end of the period covered by the report and main results achieved so far

EBOVAC1 has implemented and completed three Phase 1 clinical trials in the UK, Kenya, Uganda, Tanzania. A staged Phase 2b clinical trial in Sierra Leone is currently ongoing.

The phase 1 results from the UK study were published in *JAMA: The Journal of the American Medical Association* in April 2016 (http://dx.doi.org/10.1001/jama.2016.4218). In the UK study, the prime-boost vaccine regimen was well-tolerated and immunogenic (produced an immune response). 100 percent of study participants achieved an initial antibody response to Ebola, and this was sustained eight months following vaccination among all volunteers (figure 1). In the phase 1 trials in Africa, based on preliminary data, the regimen was well tolerated and elicited a persistent immune response (http://www.sciencedirect.com/science/article/pii/S120197121631298X).

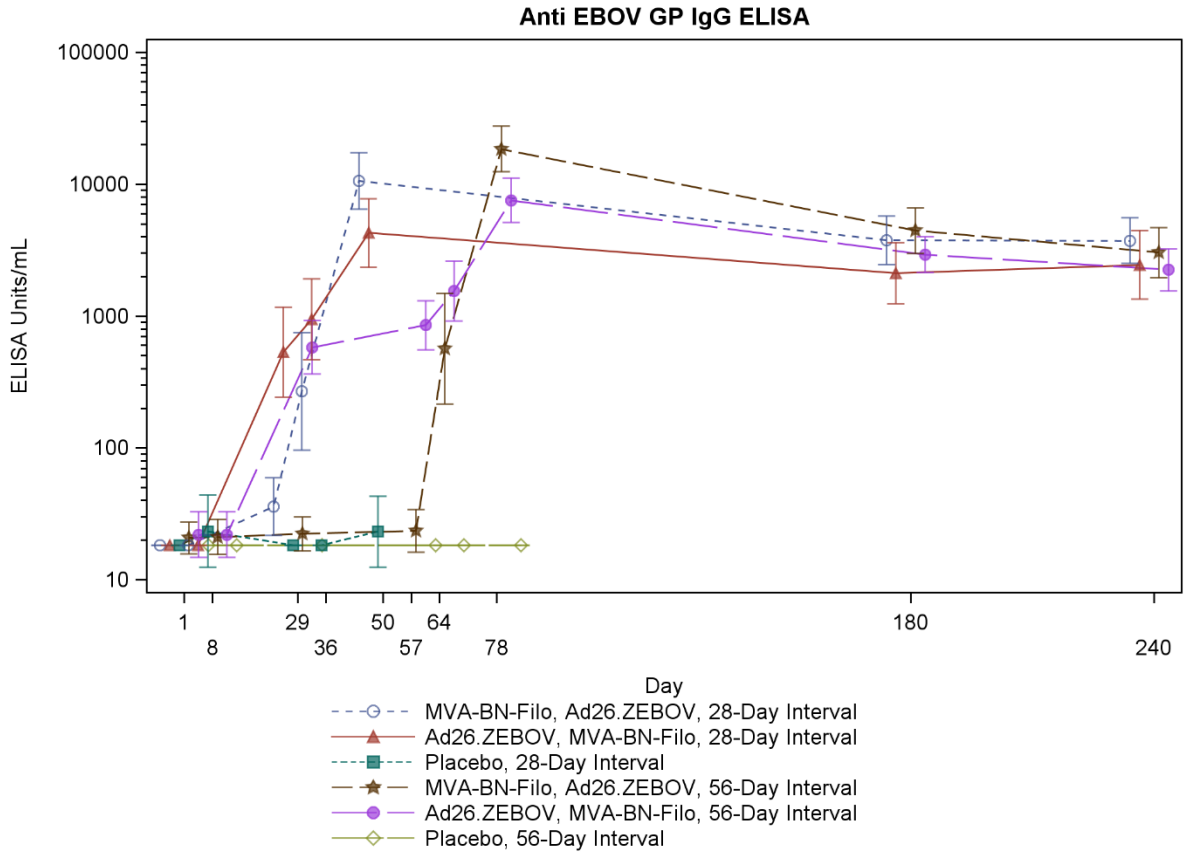

Figure 1: Anti-EBOV GP Binding Antibody Responses (ELISA): Regimen Profiles; Geometric means (with 95% CI); Immunogenicity Analysis Set (Study VAC52150EBL1001)

In September 2016, Janssen completed a submission to the World Health Organization (WHO) for Emergency Use Assessment and Listing (EUAL) for the prime-boost vaccine regimen. The EUAL is a special procedure that can be implemented where there is an outbreak of a disease with high rates of morbidity or mortality and a lack of approved treatment or prevention options. If the WHO grants EUAL this will accelerate the availability of Janssen's investigational vaccine regimen to the international community in the event another Ebola crisis occurs. The phase 1 data generated in EBOVAC1 were included in the EUAL submission.

1.3 Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the action so far)

Although the Ebola crisis in West Africa is over, the risk of a potential new outbreak in this region – or another area such as Central Africa – is real. Such a significant threat requires a long-term commitment, including implementation of surveillance systems, rapid response preparedness and the development and availability of effective vaccines.

EBOVAC1 aims to provide the data to support establishment of the safety and immunogenicity of a novel prime-boost vaccine regimen. If the vaccine regimen is found to be safe and immunogenic, it may be possible – subject to regulatory approval – for it to be licensed for use as a preventive immunisation strategy for health care workers and the general population in countries at risk of future outbreaks of EVD.

The economic costs of the last epidemic in West Africa were very high in the affected countries but also in Europe, where measures had to be taken to prevent importation of cases and also to provide support for the affected countries in Africa. The development of an effective Ebola vaccine which provides sustained protection could have financial benefits for the people of Europe as well as those living in countries at risk of future outbreaks of EVD (UN Development Group, 2015).

A further potential impact of this project is the skill and infrastructure capacity building in affected countries for vaccine development and evaluation. The EBOVAC1 project contributes in building such capacities for clinical trials in Sierra Leone by training local staff as well as establishing a vaccine depot, a research laboratory and an emergency room at the local district hospital.

Finally, the lessons learned from this project will have a positive impact on global strategies to develop vaccines quickly in situations of public health emergencies, thereby helping to improve the world's preparedness for emerging infectious diseases.