Chapter 6

Roles of VP35, VP40 and VP24 Proteins of Ebola Virus in Pathogenic and Replication Mechanisms

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http://dx.doi.org/10.5772/63830

Abstract

Ebola epidemic is a fatal disease due to Ebola virus belonging to Filoviridae; currently the viral evolution caused more than 50% of death worldwide. Among the eight proteins of ZEBOV, there are four structural proteins VP35, VP40, VP24, and NP, which have important functions in the intercellular pathogenic mechanisms. The multi-functionality of Ebola's viral proteins allows the virus to reduce its protein number to ensure its proper functioning and keeping the compact structure of the virus. Therefore, the aim of this chapter is to study the mechanism of replication and the roles of VP30, VP35, NP, and L in this process. We provide as well to highlight the influence of the virus on the immune system and on the VP24.

Keywords: Ebola, VP35, VP40, VP24, pathogenic, replication, mechanisms, immune system

1. Introduction

Ebola is an acute viral disease that has appeared in 1976 in two simultaneous outbreaks, Nzara, South Sudan, and the other in Yambuku, Democratic Republic of Congo. The latter occurred in a village near the Ebola River, from which the disease takes its name "Ebola virus" which is an endemic virus of Africa. However, Ebola virus is a member of the filovirus family, characterized by multifunctional proteins. From the appointment of this family, these viruses are filamentous, and they present various forms such as (U), (L) and (6) under electronic micro-

scope (**Figure 1**) [1]. Thus, viral propagation was due to the variant trips of populations through countries.

Although the multi-functionality of these proteins, each type has a specific role such as, GP protein that ensure important functions in the extracellular environment; otherwise, the VP35, VP40, and VP24 proteins have intracellular roles. eVP35 is usually used as symbol for "EBOLA's VP35 protein," one of the most important structural proteins of ZEBOV having diverse functions in pathogenesis mechanism and viral cycle [2]; it is an indispensable co-factor of replication transcription and an essential member of the replication complex. The virus has two other proteins, which play roles in immune response in intracellular stage.

Thus, the VP24 is a structural protein, that has the ability to internalize the cell nucleus, and known as a minor matrix protein and membrane-associated protein. Then, the latest protein "VP40" is known as a viral matrix protein, and it is the most abundant protein in Ebola's viral structure.

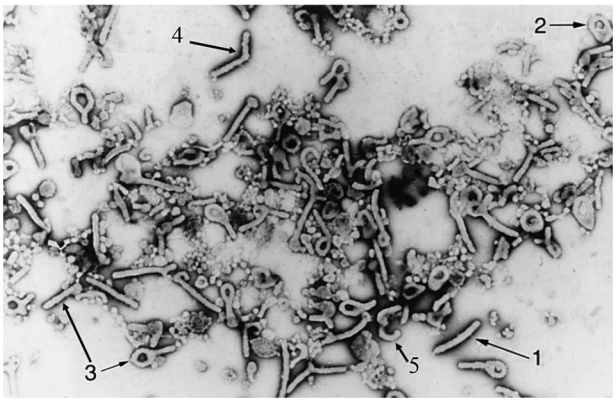

Figure 1. Marburg virus particles purified from the blood of infected guinea pigs, stained by negative contrast medium. Different forms of the virion are shown: 1, rod shaped; 2, ring shaped; 3, mace or (6); 4, (L) form, and 5, (U) form. Shaped '10.000' the virus was purified and concentrated by A, B, et al.; photo by E. Kandrushin, Center for Virology and Biotechnology ''Vector," Koltsovo, Russia) [1].

Ebola is a zoonosis disease. The bats are the main natural reservoir of the virus, while also chimpanzee and some other animals could transmit EBOV virus to human. Transmission modes are diverse and not manageable: contact with fluids of infected persons, possibility of aerosol transmission [3, 4] and contact with infected animals [5]; here we must mention that the religious, cultural and traditional practices help the large propagation of virus among African population and that simple actions can limit the propagation of the virus. Epidemiological studies of WHO and CDC have shown that adults are more subjected to infection than children. Furthermore, Ebola virus can infect both men and women [6]. The virus has the ability to replicate in monocyte-derived dendritic cells without engendering an inflammatory response [7].

coded for secretory glycoproteins, membrane glycoproteins, and thus it is subdivided into subunits called as GP1 and GP2. However, the sGP has not the membrane region. The Ebola genome contains six interagency regions, having functions in regulation of transcription of genes and the CAP-polyA to protect the mRNA. Those regions contain a RNA 2D confirmation boots. The immune evasion processes in Filoviridae generally, and essentially for Ebola virus based on two complementary process; one intercellular by GP and second intracellular where the roles remarkable of VP35 by inhibition of RIG-I and INF-3, therefore, the roles of VP40 and VP24 inhibition of INF-β signal.

Acknowledgements

The authors would like to thank the ministry of higher education, University Hassan II of Casablanca, Faculty of Sciences and Technics and the Laboratory of Virology, Microbiology, Quality and Biotechnologies/Ecotoxicology and Biodiversity.

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