

# Genetic Leap: The Greatest Medical Fiction



As medical professionals and editors of journal we were keeping an eye on every post coming to us through medical fraternity and various articles published in many journals and news papers covering the Ebola menace. So much confusion, speculations and fear we never expected from our medical fraternity, that Ebola can become air-borne.

Before going into, in depth analysis of this speculation, it is our need to understand the basic structure and mechanism of action of Ebola.

*Ebolavirus* (named after the Ebola River in Zaire) is a member of family *Filoviridae*, and order *Mononegavirales*.<sup>1</sup> Ebola is helical, non-segmented, negative, single-stranded polymorphic RNA virus, usually 920 nm in length, 80 nm in diameter and encodes for a nucleoprotein, a glycoprotein, 7 polypeptides, a polymerase, and 4 other undesigned proteins. These proteins are transcribed in the host cell from the virus RNA.<sup>2</sup>

Ebola is thermo-stable and can withstand upto 60 degree centigrade but is terminated by gamma and ultraviolet radiation, lipid solvents,  $\beta$ -propiolactone, and commercial phenolic disinfectants.

The Ebola has got its capability to infect new cells by its envelope made up of glycoprotein (GP). The Ebola genome consists of seven genes and one of these genes leads to generation of two proteins via transcription. The first protein, sGP, does not come in contact with the cell surface, while the second protein, GP, contains a tail, making it responsible for the infection of new cells. The things got complicated further, because the immune response is mitigated by the presence of sGP. For this reason, the goal is to create an antibody that will target the GP while ignoring sGP.

Amongst humans, Ebola is transmitted by contact with infected bodily fluids and/or tissues.<sup>3,4</sup> There is evidence of a possible respiratory route of transmission of Ebola in nonhuman primates.<sup>3</sup> Even if Ebola is transmitted via the respiratory route to nonhuman primates, humans may be resistant to the airborne/aerosol transmission of Ebola (may not have the right receptors).

Ebola is normally carried by fruit bats, but sometimes by humans also, and when it happens then its mortality rate is estimated to be 50% approximately. Ebola spreads by direct contact with bodily fluids. Ebola does not spread through air. But the speculations regarding its air borne transmission are also made, due to its habit of rapid mutation.

We know that Ebola is experiencing plenty of mutations due to RNA as its genetic material. When RNA is copied, many more mistakes are made than when DNA is copied. This gives viruses like Ebola a particularly high mutation rate when compared to DNA-based viruses.

Ebola mutates whenever it is copied. *Evolution* occurs when these mutations are passed down from generation to generation, via natural selection. The idea here is that if an Ebola virus particle were to wind up with mutations that allowed it to be transmitted through the air, that viral lineage might be favored and spread. In the case of Ebola, the virus is not mutating “in order to” spread faster and that mutations allowing this occur are not more likely than mutations with any other effect.

Is there any chance that it might become transmissible through the air, seems to be almost impossible, for reasons well put in by Laurie Garrett, a senior fellow for global health. What is now a fluid-borne virus attaching itself to cells lining the circulatory system can’t easily change into one that targets the tiny air sacs in the lungs. The virus probably will not go airborne, but it could conceivably increase its Darwinian fitness in other ways, becoming more subtle and elusive.

While Ebola’s ongoing evolution is unlikely to lead to an airborne virus, it is likely to lead to other changes that will affect how we fight this deadly outbreak.

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A number of tests can be used to diagnose Ebola within a few days of the onset of symptoms, which can detect the virus's genetic material or the presence of antibodies against the pathogen.

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