Efficient Ar/O2 and/or N2 plasma inactivation of infective human adenoviruses

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Over the last decade, numerous studies have described the lethal activity of plasma treatments for successful inactivation of a large variety of microorganisms, including Gram-positive and Gram-negative bacteria, bacterial and fungal spores, yeasts, molds and viruses [1]. Human adenoviruses (HAdV), commonly causing respiratory, ophthalmic and gastrointestinal infections, withstand number of sterilization processes, owing to their robust protein capsid. Two recently published reports indicate the potential of plasma applications for reducing the infectivity of adenoviruses [2-3]. However, these plasma treatments often do not indicate structural damage of the viral capsid, thought to be the main cause of inactivation rather than DNA destruction [2], or remain long with still reduced inactivation efficiency.

In the present work, exposure of HAdV-2 suspensions to Ar/O_2 and/or N_2 plasma afterglows under reduced pressure (2 mbars) and 35°C during less than 5 minutes, enabled up to 6-log reductions of the infective viral titer, as shown by infectious state assays performed on HEK 293A host cells (**Fig. 1**). This reduction range is highly suitable for an efficient decontamination process. In parallel, transmission electron microscopy observations of plasma-treated HAdV-2 particles, currently under investigation, will help clarifying the effects of the plasma-active agents on the structural integrity of the viral capsid. Variation of ROSRNS involved in the decontamination process will be evaluated depending on gas mixtures.

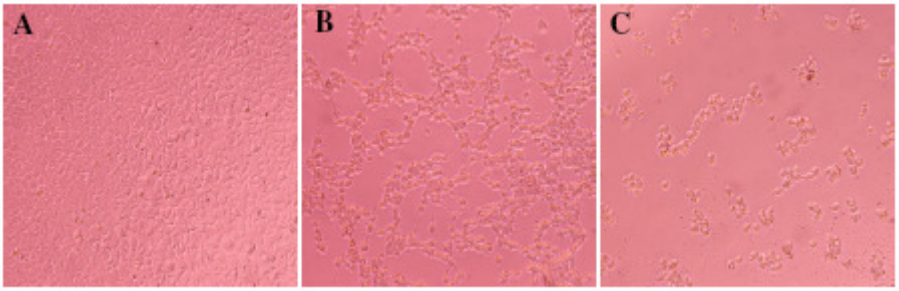

Figure 1: *Infectivity assays of human adenoviruses with HEK 293A cells; light microscope images show host cell layers (A) infected by HAdV-2 particles, resulting in progressive cell death (B) until complete plaque lysis (C)*

References

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