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Hybrid Track-Etched Membranes as Antiviral Filters

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ABSTRACT

Background: The era of development and practical use of biomedical technologies based on track membranes is just beginning. The immobilization of compounds with antiviral properties on the membrane is expected to increase the effect of pore size-dependent inhibition of virus propagation. Aim: The aim of this study was to investigate the possibility of retaining viral particles by microfiltration track membranes modified with curcumin and silver nanoparticles, known for their antimicrobial activity. Methods: Polyethylene terephthalate track membranes (Dubna, Russia) with 0.05 μm pore size were used in this work. Silver nanoparticles and curcumin were immobilized on microfiltration track-etched membranes through a static sorption process. Viruses were propagated in Vero and MDCK cells. The filtered viruses were titrated using a cell-based cytopathic assay. Results: Preliminary results from our ongoing studies have shown the efficacy of curcumin- or silver nanoparticle-enriched track membranes in reducing viral load of both DNA and RNA viruses. The possibility of immobilizing other antiviral substances on track membranes, in particular selected on the base of screening of 297 natural compounds, is under study. Current results show higher efficiency of retention of relatively large enveloped viruses. Conclusions: Track membranes containing antiviral compounds have demonstrated effective protection against viruses and require further development for use in medical protective equipment.

Keywords: track-etched membranes, antiviral filters, viruses

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