XPEL® RX Silver Ion Protection Film For COVID-19

Based on available evidence up to 12 May 2020

INTRODUCTION

XPEL® RX silver ion protection film is a product from US which was a provider of protective films for the automotive industry since 1997. It was claimed to be specially formulated containing silver ions and treated with anti-microbial and fungistatic agents which inhibits the growth of microbes on the film's surface.[1]

Silver ions (Ag^+) are widely used as an antibacterial agent for many types of medical devices. The clinical importance of silver has been recognized for over 2000 years and it is normally used in the form of nitrate to achieve required antimicrobial action. Nanoparticles of silver have been shown to have better dispersion stability, uniform distribution and increase the surface area accessible for the microbial exposure.[2] Thus, it had an excellent antibacterial and bactericidal properties.[3] Silver nanoparticles has also been studied on potential use in development of novel antimicrobial agents, drug-delivery formulations, detection and diagnosis platforms, biomaterial and medical device coatings, tissue restoration and regeneration materials, complex healthcare condition strategies and performance-enhanced therapeutic alternatives.[4] Experimental studies showed that the anti-pathogenic activity of silver nanoparticles is better than that exhibited by silver ions.[4]

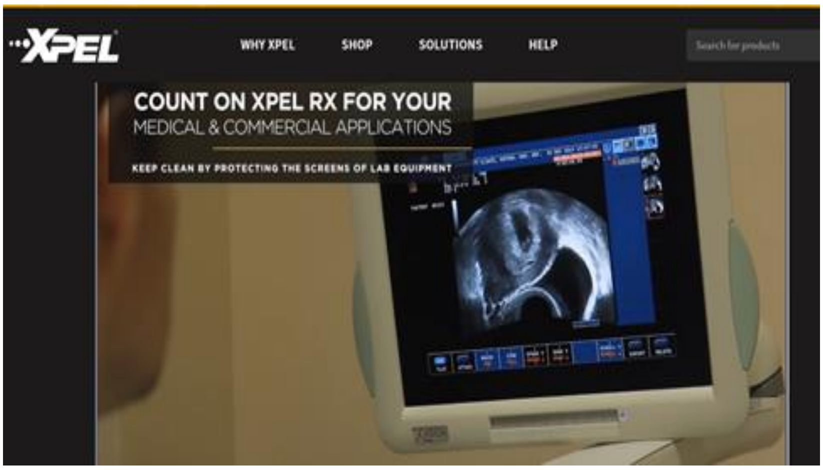

Figure 1. XPEL RX protection film use for imaging devices[1]

Hence, this rapid review is conducted to provide scientific evidence on the use of XPEL® RX silver ion protection film for COVID-19 based on a request from the Medical Care Quality Section (MOH) following a proposal from a company to introduce the technology.

EVIDENCE ON EFFECTIVENESS AND SAFETY

There was no retrievable evidence from scientific databases such as Medline, EBM Reviews, EMBASE via OVID, PubMed and from the general search engines (Google Scholar) related to XPEL® RX silver ion protection film for COVID-19.

However, there were 11 retrievable studies related to the use of silver ions as an antibacterial agent used in coating or film for medical devices. Based on the report, the results are summarised in table below:

Study	**Year**	**Types of Silver ions used**	**Types of medical device**	**Results**
Samberg et al.[5]	2013	Silver ions	Electrically-activated silver-based medical device	Antibacterial efficacy against *E. coli* and *S. aureus* strains
Taheri et al.[6]	2014	Silver nanoparticles	Medical devices such as implants and wound dressings	Antibacterial efficacy against three pathogenic bacteria i.e. *Staphylococcus epidermidis, Staphylococcus aureus* and *Pseudomonas aeruginosa.*
Li et al.[3]	2015	Modified polypropylene surface loaded with the Ag NPs capped with d-α-tocopheryl polyethylene glycol 1000 succinate (TPGS)	blood-contacting medical devices such as heart valves, catheters, pacemaker leads, hemodialysis membranes and	Antibacterial activities (bacteria adhesion, bactericidal activity, biofilm formation) against Gram-negative *Escherichia coli* and Gram-positive *Staphylococcus aureus*

			blood storage devices	
Gilabert-Pores et al.[7]	2016	Silver micro/nanoparticles	Medical device for implantation	Antibacterial properties combined with an antifouling behavior causing a reduction of Gram-positive and Gram-negative bacteria viability (*P. aeruginosa, S. aureus)*
Goncalves et al.[8]	2017	Reused silver loaded substrate: Phosphotungstate Ormosil doped with core-shell ($SiO_2@TiO_2$) and Ag nanoparticle photoassisted synthesis (POrs-CS-Ag)	Any medical device-related infection	Antibacterial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa*
Jyoti et al.[9]	2017	Phytosynthesized silver nanoparticles (AgNPs) coating	AgNPs coating on glass surfaces such as artificial prosthetics and catheters	Bactericidal activity against *Staphylococcus epidermidis* and *Staphylococcus aureus*
Kim et al.[10]	2017	Silver nanoparticles (silver nitrate, $AgNO_3$, 99%) on a polydimethylsiloxane (PDMS) film	Silicon-based implanting device (AgNP—coated) such as catheters, prosthetics, bone adhesives, contact lenses	-Effective antibacterial activity of the nanocomposites against both *E. coli* and *S. aureus* was achieved -No significant AgNP-mediated cytotoxicity driven by AgNP on PDMS film was

			and ureteral stents	observed.
Barkat et al.[2]	2018	Silver nanoparticles (AgNPs)	Any medical device	Antimicrobial activity according to the diameter of AgNPs against *Escherichia coli, Pseudomonas aeruginosa, Salmonella typii, Klebsiella pneumonia, Vibrio cholera, Bacillus subtilis, Listeria monocytogenes, Staphylococcus aureus, Clostridium diphtheria*
Burdusel et al.[4]	2018	Silver nanoparticles (AgNPs)	Any medical device	Anti-inflammatory, anti-angiogenesis, antiplatelet, antiviral, antifungal, and antibacterial activities against methicillin-resistant *Staphylococcus aureus*
Liao et al.[11]	2019	Silver nanoparticles (AgNPs)	Aliphatic polyester nanocomposites with silver nanoparticles	Effective to kill multi-drug resistant bacteria that cause medical device-related infections (*Enterococcus faecalis, S. aureus, S. epidermidis, E. coli, Klebsiella pneumoniae, Proteus mirabilis, and P. aeruginosa)*
Puca et al.[12]	2019	Microcrystalline titanium dioxide (TiO2) nanoparticles covalently linked with monovalent silver ions (Ag+)	Medical device containing TIAB	Effective towards *Staphylococcus spp., Enterococcus spp. and Escherichia coli* and also inhibiting biofilm formation.

SAFETY

There was no retrievable evidence on safety related to the use of XPEL® RX silver ion protection film. However, the toxicity studies performed in a rat ear model proved that the silver nanoparticles exposure resulted in significant mitochondrial dysfunction and subsequent temporary or permanent hearing loss, depending on the inoculation dose. Low concentrations of silver nanoparticles also were absorbed by retinal cells and resulted in important structural disruption, due to the increased number of cells that underwent oxidative stress.[4]

There was no retrievable evidence on the safety. However, the use of infrared thermography is considered safe as it is non-invasive, contactless and non-radiant.[9]

Cost

The cost of the device ranges between USD499.00 to USD3000.00.[10-12]

CONCLUSION

There was no evidence retrieved from the scientific databases on the effectiveness and safety of XPEL® RX Silver Ion Protection film for COVID-19.

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