7

Appendix D: Review of Published Data - Table 7 : PVP-I									
Enveloped Viruses									
Virus/ Strain	**Statement of Identity**	**Active Ingredient/ Concentration**	**Active Conc. Tested**	**Viral Diluent**	**Test Type/ Carrier**	**Test Method/Description**	**Contact Time**	**Virucidal Results**	**Ref.**
Cytomegalo-virus	Antiseptic	PVP-I (Betadine)	Not available	Not available	Not available	Not available	Not available	"killed"	The Purdue Frederick Company, 1999
Cytomegalo-virus (clinical isolates)	Not available	10% PVP-I	0.025%	Growth media or urine	Glove	**Simulated Hand wash.** Sterile latex gloves placed on screen. 0.2mL viral suspension inoculated on fingertips and dried 5 minutes. 5mL test material dropped by pipette over fingertip followed by 5mL distilled water. Following contact time virus eluted by swab, swab immersed in 2mL transport media and assayed in human foreskin fibroblasts.	5-240 minutes	No virus recovered.	Faix, 1987
Cytomegalo-virus (clinical isolates)	Not available	10% PVP-I	0.025%	Growth media or urine	Glove	**Simulated Hand wash.** Excised skin placed on sterile latex gloves resting on screen. 0.2mL viral suspension inoculated on fingertips and dried 5 minutes. 5mL test material dropped by pipette over fingertip followed by 5mL distilled water. Following contact time virus eluted by swab, swab immersed in 2mL transport media and assayed in human foreskin fibroblasts.	5-240 minutes	No virus recovered.	
Herpes Simplex-1 (Strain F(1) ATCC VR-733)	Surgical scrub	7.5% PVP-I	Undiluted	Undiluted	Suspension	**Time Kill Method.** 0.2mL viral inoculum was added to 1.8mL test material and mixed. Following contact time, the mixture was neutralized by dilution in FBS and ten fold serial dilutions in cell culture media and plated on Vero cells.	15 seconds	≥99.97%	Brady *et al.*, 1995
			0.75%				15 seconds	≥99.99%	
Herpes Simplex	Germicide	Iodine with non-ionic detergent	75ppm	Maint. media in EBSS	Suspension	**Time Kill Method.** 0.1mL viral inoculum was added to 0.9mL test material and mixed. Following contact time, the virus was grown in rabbit kidney cells.	10 minutes	Inactivated virus	Klein and Deforest, 1963b
Herpes Simplex Type 1	Antiseptic	PVP-I (Betadine)	Not available	Not available	Not available	Not available	Not available	"killed"	The Purdue Frederick Company, 1999
Herpes Simplex	Cold sore paint	PVP-I/ Alcohol	10%/ 30%	None	Ulcer treatment	**Clinical Study.** Patients' ulcers were swabbed to recover virus. Ulcers were treated with test material and swabbed after contact time. Virus was cultured in human fibroblasts. Treatment was considered effective if no virus was recovered.	120 minutes	Virus shedding undetectable in 60-64% of cases	Simmons, 1997
Herpes Simplex Type 2	Antiseptic	Not available (Betadine)	Not available	Not available	Not available	Not available	Not available	"killed"	The Purdue Frederick Company, 1999

Appendix D: Review of Published Data - Table 7 : PVP-I									
Enveloped Viruses									
Virus/ Strain	**Statement of Identity**	**Active Ingredient/ Concentration**	**Active Conc. Tested**	**Viral Diluent**	**Test Type/ Carrier**	**Test Method/Description**	**Contact Time**	**Virucidal Results**	**Ref.**
HIV-1 (Strain HTLV IIIB)	Surgical scrub	7.5% PVP-I	Undiluted	Undiluted	Suspension	**Time Kill Method.** 0.2mL viral inoculum was added to 1.8mL test material and mixed. Following contact time, the mixture was neutralized by dilution in FBS and ten fold serial dilutions in cell culture media and plated on MT-2 cells.	15 seconds	≥99.94%	Brady *et al.*, 1995
			0.75%				15 seconds	≥99.99%	
HIV	Preoperative preparation	10% PVP-I	0.05%	RPMI 1640 20% FCS	Suspension	**Time Kill Method.** Cell free viral stocks were incubated in 200µL media containing test material and mixed. Following contact time, the virus was neutralized with 0.5% sodium thiosulfate and inoculated onto H-9 cells. Virus replication was determined by assay of reverse transriptase levels in culture supernatant fluids.	Immediate vortex	0 – 1.06 $\log_{10}$ cpm reduction of reverse transcriptase activity vs. control day 7 - 21	Kaplan *et al.*, 1987
							30 seconds		
							1 minute		
HIV	Preoperative preparation	10% PVP-I	0.25%	RPMI 1640 20% FCS	Suspension	**Time Kill Method.** Cell free viral stocks were incubated in 200µL media containing test material and mixed. Following contact time, the virus was neutralized with 0.5% sodium thiosulfate and inoculated onto H-9 cells. Virus replication was determined by assay of reverse transriptase levels in culture supernatant fluids.	Immediate vortex	Virus replication completely inhibited	
							30 seconds	Virus replication completely inhibited	
							1 minute	Virus replication completely inhibited	
HIV	Surgical scrub	7.5% PVP-I	0.125%	RPMI 1640 20% FCS	Suspension	**Time Kill Method.** Cell free viral stocks were incubated in 200µL media containing test material and mixed. Following contact time, the virus was neutralized with 0.5% sodium thiosulfate and inoculated onto H-9 cells Virus replication was determined by assay of reverse transriptase levels in culture supernatant fluids	1 minute	0.11 – 1.78 $\log_{10}$ cpm reduction of reverse transcriptase activity vs. control day 7 - 21	
							10 minutes		
HIV	Surgical scrub	7.5% PVP-I	0.25%	RPMI 1640 20% FCS	Suspension	**Time Kill Method.** Cell free viral stocks were incubated in 200µL media containing test material and mixed. Following contact time, the virus was neutralized with 0.5% sodium thiosulfate and inoculated onto H-9 cells. Virus replication was determined by assay of reverse transriptase levels in culture supernatant fluids.	1 minute	Virus replication completely inhibited	
							10 minutes	Virus replication completely inhibited	

Appendix D: Review of Published Data - Table 7 : PVP-I									
Enveloped Viruses									
Virus/ Strain	**Statement of Identity**	**Active Ingredient/ Concentration**	**Active Conc. Tested**	**Viral Diluent**	**Test Type/ Carrier**	**Test Method/Description**	**Contact Time**	**Virucidal Results**	**Ref.**
HIV	Not available	Betadine II solution	0.125% weight/ volume	TCF	Suspension	Not available	0.5 - 1 minute	No virus inactivated	Sattar and Springthorpe, 1991
			0.25% weight/ volume				0.5 - 1 minute	Up to 10.8% virus inactivated	
			0.5% weight/ volume				0.5 - 1 minute	All detectable virus inactivated	
HIV	Not available	Betadine douche	0.33% weight/ volume	TCF	Suspension	Not available	0.5 - 1 minute	No virus inactivated	
			0.5% weight/ volume				0.5 - 1 minute	All detectable virus inactivated	
HIV	Not available	Betadine solution	0.25% weight/ volume	TCF	Suspension	Not available	0.5 - 1 minute	Up to 40.3% virus inactivated	
			0.5% weight/ volume				0.5 - 1 minute	All detectable virus inactivated	
HIV	Not available	Pharmadine solution	0.25% weight/ volume	TCF	Suspension	Not available	0.5 - 1 minute	Up to 51.7% virus inactivated	
			0.5% weight/ volume				0.5 - 1 minute	All detectable virus inactivated	
HIV	Not available	Betadine medicated douche	0.25% weight/ volume	TCF	Suspension	Not available	0.5 - 1 minute	No virus inactivated	
			0.5% weight/ volume				0.5 – 10 minutes	All detectable virus inactivated	
HIV	Not available	Betadine antiseptic gel	0.25% weight/ volume	TCF	Suspension	Not available	0.5 – 10 minutes	No virus inactivated	
			0.5% weight/ volume				0.5 – 10 minutes	All detectable virus inactivated	

Appendix D: Review of Published Data - Table 7 : PVP-I Enveloped Viruses									
Virus/ Strain	**Statement of Identity**	**Active Ingredient/ Concentration**	**Active Conc. Tested**	**Viral Diluent**	**Test Type/ Carrier**	**Test Method/Description**	**Contact Time**	**Virucidal Results**	**Ref.**
HIV	Not available	Betadine standardized solution	0.25% weight/ volume	TCF	Suspension	Not available	0.5 – 10 minutes	Up to 56.7% virus inactivated	Sattar and Springthorpe, 1991
			0.5% weight/ volume				0.5 – 10 minutes	All detectable virus inactivated	
HIV	Not available	Betadine lubricating antiseptic gel	0.25% weight/ volume	TCF	Suspension	Not available	0.5 – 10 minutes	Up to 18.75% virus inactivated	
			0.5% weight/ volume				0.5 – 10 minutes	No virus inactivated	
			1.0% weight/ volume				0.5 – 10 minutes	Up to 75% virus inactivated	
			2.5% weight/ volume				0.5 – 10 minutes	All detectable virus inactivated	
HIV	Not available	Betadine scrub	0.5% weight/ volume	TCF	Suspension	Not available	0.5 – 10 minutes	All detectable virus inactivated	
HIV	Not available	Betadine scrub II	0.5% weight/ volume	TCF	Suspension	Not available	0.5 – 10 minutes	All detectable virus inactivated	
HPIV-3	Preoperative preparation	10% PVP-I	Undiluted	feces or bovine mucin	Stainless steel	**Carrier Method.** 10µL viral suspension inoculated on carrier and dried 1 hour. 20µL test material placed on carrier. After contact time mixture neutralized by dropping carrier in 1mL TPB. Virus assayed in MA-104 cells.	1 minute	≥3 $\log_{10}$ reduction	Sattar *et al.*, 1989
Human coronavirus (229E)	Preoperative preparation	10% PVP-I	Undiluted	feces or bovine mucin	Stainless steel	**Carrier Method.** 10µL viral suspension inoculated on carrier and dried 1 hour. 20µL test material placed on carrier. After contact time mixture neutralized by dropping carrier in 1mL TPB. Virus assayed in L-132 cells.	1 minute	≥3 $\log_{10}$ reduction	Sattar *et al.*, 1989
Influenza (Type A Strain A2/ Hong Kong ATCC VR-544)	Surgical scrub	7.5% PVP-I	Undiluted	Undiluted	Suspension	**Time Kill Method.** 0.2mL viral inoculum was added to 1.8mL test material and mixed. Following contact time, the mixture was neutralized by dilution in FBS and ten fold serial dilutions in cell culture media and plated on Rhesus monkey kidney cells	15 seconds	≥99.90%	Brady *et al.*, 1995
			0.75%				15 seconds	≥99.99%	

Appendix D: Review of Published Data - Table 7 : PVP-I									
Enveloped Viruses									
Virus/ Strain	**Statement of Identity**	**Active Ingredient/ Concentration**	**Active Conc. Tested**	**Viral Diluent**	**Test Type/ Carrier**	**Test Method/Description**	**Contact Time**	**Virucidal Results**	**Ref.**
Influenza (A)	Antiseptic	Not available (Betadine)	Not available	Not available	Not available	Not available	Not available	"killed"	The Purdue Frederick Company, 1999
Influenza (Asian)	Germicide	Iodine with non-ionic detergent	75ppm	Maint. media in EBSS	Suspension	**Time Kill Method.** 0.1mL viral inoculum was added to 0.9mL test material and mixed. Following contact time, the virus was grown in the allantoic cavity of the chick embryo.	10 minutes	Inactivated virus	Klein and Deforest, 1963b
Rabies	Antiseptic	PVP-I (Betadine)	Not available	Not available	Not available	Not available	Not available	"killed"	The Purdue Frederick Company, 1999
Rubella	Antiseptic	PVP-I (Betadine)	Not available	Not available	Not available	Not available	Not available	"killed"	The Purdue Frederick Company, 1999
Vaccinia virus	Germicide	Iodine with non-ionic detergent	75ppm	Maint. media in EBSS	Suspension	**Time Kill Method.** 0.1mL viral inoculum was added to 0.9mL test material and mixed. Following contact time, the virus was was grown in HeLa cells.	10 minutes	Inactivated virus	Klein and Deforest, 1963b
Vaccinia virus	Antiseptic	PVP-I (Betadine)	Not available	Not available	Not available	Not available	Not available	"killed"	The Purdue Frederick Company, 1999

µL	microliter	HTLV	Human T-cell lymphotropic virus
ATCC	American Type Culture Collection	Maint.	Maintenance
cpm	counts per minute	mL	milliliter
EBSS	Earle's balanced salt solution	ppm	parts per million
FBS	Fetal bovine serum	PVP-I	Povidone-iodine
FCS	Fetal calf serum	TCF	Tissue culture fluid
HIV	Human immunodeficiency virus	TPB	Tryptose phosphate buffer
HPIV	Human parainfluenza virus		