**Sequence alignment of L1SHORT proteins of MnPV and HPV6, 16 & 18**

CLUSTAL O(1.2.4) multiple sequence alignments

 **BC loop**

MnPV-L1 MAYWLPNNQKLYLP-PAPVQRILSTDEFTTRTDIYYYASSDRLLTVGNPYYPILDG--DT 57

HPV18-L1 MALWRPSDNTVYLPPP-SVARVVNTDDYVTRTSIFYHAGSSRLLTVGNPYFRVPAGGGNK 59

HPV16-L1 MSLWLPSEATVYLP-PVPVSKVVSTDEYVARTNIYYHAGTSRLLAVGHPYFPIKKPNNNK 59

HPV6-L1 M--WRPSDSTVYVPPPNPVSKVVATDAYVTRTNIFYHASSSRLLAVGHPYFSIKRA--NK 56

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 **BC loop** **DE loop**

MnPV-L1 VTVPKVSPNQYRVFRCKLPDPNRFAFGEKSVYDPEKQRLAWCIRGVEIARGQPLGIGITG 117

HPV18-L1 QDIPKVSAYQYRVFRVQLPDPNKFGLPDTSIYNPETQRLVWACAGVEIGRGQPLGVGLSG 119

HPV16-L1 ILVPKVSGLQYRVFRIHLPDPNKFGFPDTSFYNPDTQRLVWACVGVEVGRGQPLGVGISG 119

HPV6-L1 TVVPKVSGYQYRVFKVVLPDPNKFALPDSSLFDPTTQRLVWACTGLEVGRGQPLGVGVSG 116

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 **DE loop EF loop**

MnPV-L1 HPLYNRLEDVENPGKYPSAPGTDNRQNVGLDPKQTQMFIVGCVPAQGEHWSRALTCSNQV 177

HPV18-L1 HPFYNKLDDTESSHAATSNVSEDVRDNVSVDYKQTQLCILGCAPAIGEHWAKGTACKSRP 179

HPV16-L1 HPLLNKLDDTENASAYAANAGVDNRECISMDYKQTQLCLIGCKPPIGEHWGKGSPCTNVA 179

HPV6-L1 HPFLNKYDDVENSG-SGGNPGQDNRVNVGMDYKQTQLCMVGCAPPLGEHWGKGKQCTNTP 175

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 **EF loop**

MnPV-L1 VKKGDCPPIQRMSGMIEDGDMGDIGYGNLDFRVLQENKSEVPLEVVDSICKYPDYLGMSK 237

HPV18-L1 LSQGDCPPLELKNTVLEDGDMVDTGYGAMDFSTLQDTKCEVPLDICQSICKYPDYLQMSA 239

HPV16-L1 VNPGDCPPLELINTVIQDGDMVDTGFGAMDFTTLQANKSEVPLDICTSICKYPDYIKMVS 239

HPV6-L1 VQAGDCPPLELITSVIQDGDMVDTGFGAMNFADLQTNKSDVPIDICGTTCKYPDYLQMAA 235

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 **FG loop**

MnPV-L1 ETHGNSCFFYARQARLYSRHFFNRAGVQGETVPESLYKKGKDGQAQSTLALATYSGTPSG 297

HPV18-L1 DPYGDSMFFCLRREQLFARHFWNRAGTMGDTVPQSLYIKGTGMRA--SPGSCVYSPSPSG 297

HPV16-L1 EPYGDSLFFYLRREQMFVRHLFNRAGTVGENVPDDLYIKGSGSTA--NLASSNYFPTPSG 297

HPV6-L1 DPYGDRLFFFLRKEQMFARHFFNRAGEVGEPVPDTLIIKGSGNRT--SVGSSIYVNTPSG 293

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 **HI loop**

MnPV-L1 SLVSSDAVLFNRPYWLERAQGQNNGILWNNDLFVTVLDNTRGTHFSISIATQ--DENDYT 355

HPV18-L1 SIVTSDSQLFNKPYWLHKAQGHNNGVCWHNQLFVTVVDTTRSTNLTICASTQSPVPGQYD 357

HPV16-L1 SMVTSDAQIFNKPYWLQRAQGHNNGICWGNQLFVTVVDTTRSTNMSLCAAIST-SETTYK 356

HPV6-L1 SLVSSEAQLFNKPYWLQKAQGHNNGICWGNQLFVTVVDTTRSTNMTLCASVTT-S-STYT 351

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**HI loop**

MnPV-L1 ASNYKQYTRHVEEFELEFIFQLVKINLSTEVLAYLHGMDPSILDNWNLTLGPPNDGSLAD 415

HPV18-L1 ATKFKQYSRHVEEYDLQFIFQLCTITLTADVMSYIHSMNSSILEDWNFGVPPPPTTSLVD 417

HPV16-L1 NTNFKEYLRHGEEYDLQFIFQLCKITLTADVMTYIHSMNSTILEDWNFGLQPPPGGTLED 416

HPV6-L1 NSDYKEYMRHVEEYDLQFIFQLCSITLSAEVMAYIHTMNPSVLEDWNFGLSPPPNGTLED 411

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MnPV-L1 KYRFIESLATKCPDN-VEVTKPDPYKGRIFWNIDLTERLTADLDQFSLGRKFLYQHARIS 474

HPV18-L1 TYRFVQSVAITCQKDAAPAENKDPYDKLKFWNVDLKEKFSLDLDQYPLGRKFLVQAGLRR 477

HPV16-L1 TYRFVTSQAIACQKHTPPAPKEDPLKKYTFWEVNLKEKFSADLDQFPLGRKFLLQAGLKA 476

HPV6-L1 TYRYVQSQAITCQKPTPEKEKPDPYKNLSFWEVNLKEKFSSELDQYPLGRKFLLQSGYRG 471

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MnPV-L1 NRKRSLPASRNGGGTSSSSTKRRK-K---- 499

HPV18-L1 KPTIGPRKRSAPSATTSSKPAKRVRVRARK 507

HPV16-L1 KPKFTLGKRKATPTTSSTSTTAKRKKRKL- 505

HPV6-L1 RSSIRTGVKRPAVSKASAAPKRKRAKTKR- 500

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Marked areas based on: Zhang, X., Li, S., Modis, Y., Li, Z., Zhang, J., Xia, N., and Zhao, Q. (2016). Functional assessment and structural basis of antibody binding to human papillomavirus capsid. Reviews in medical virology *26*, 115-128.