

Table 2. Prophylactic VLP vaccine against oncoviruses in preclinical evaluation

Virus	Cancer Type	Tumor antigens	Adjuvants	Expression system	References
Human papillomavirus	Cervical cancer	L2 (epitope 20-38)	Montanide	<i>Pyrococcus furiosus</i> (PfTrx)	[61]
Human papillomavirus	Cervical cancer	L2 (epitope 17-31)	alum hydroxide	MS2 and PP7	[62]
Human papillomavirus	Cervical cancer	L2 RG1 epitope and VAR2CSA PM antigen	alum hydroxide	AP205 caspid	[71]
Human herpes virus-8	Kaposi's sarcoma	gpK8.1 ED fused to NDV fusion protein (F)	alum/MPL	Plasmid transfected into CHO or HEK-293 cells	[72]
Epstein-Barr Virus	Lymphomas, gastric carcinoma and nasopharyngeal carcinoma	gp350 and CD21	none	293-VII+ cells or exosomes from HEK293 cells	[68]
Epstein-Barr Virus	Lymphomas, gastric carcinoma and nasopharyngeal carcinoma	gp350/220	none	Plasmid transfected in CHO cells	[36]
Epstein-Barr Virus	Lymphomas, gastric carcinoma and nasopharyngeal carcinoma	EBNA1 and LMP2	none	Plasmid transfected in CHO cells	[73]
Epstein-Barr Virus	Lymphomas, gastric carcinoma and nasopharyngeal carcinoma	gp350, gB, gp42 and gH/gL	aluminum hydroxide and monophosphoryl lipid A	Plasmid transfected in AGS-EBV-eGFP cells	[74]
Epstein-Barr Virus	Lymphomas, gastric carcinoma and nasopharyngeal carcinoma	HBc149, gp350	aluminum hydroxide and AS04	<i>E. coli</i>	[75]
HCV Hepatitis C virus	Hepatocellular carcinoma	HBV pre-S1 (20-47)	none	<i>E. coli</i>	[76]
HCV Hepatitis C virus	Hepatocellular carcinoma	E1, E2	alhydrogel	Baculovirus	[77,78]
HCV Hepatitis C virus	Hepatocellular carcinoma	E1, E2	none	Adenovirus	[79]
HBV Hepatitis B virus	Hepatocellular carcinoma	HBsAgS	aluminum hydroxide	Plasmid transfected in human embryonic kidney (HEK) FreeStyle-293F cells	[50]
HBV Hepatitis B virus	Hepatocellular carcinoma	HBc	none	<i>Pichia pastoris</i>	[51]