

## Appendix 2: HPV Vaccine Patent Landscape in India

Assignee/ Applicant	PCT Application No/ International Publication No	Indian Application No. & Application Date in India	Publication Date/ Application Date	Granted Patent No. (Publication Date of Grant)	Expiry Date	Summary of Claims
Glaxo Smithkline Biologicals SA.	PCT/EP2005/006461 (WO 05/123125)	3436/KOLNP/2006	6.15.2007/ 11.20.2006	Pending		-An immunogenic vaccine composition containing VLPs, and/or capsomeres of HPV 16, 18 and at least one other HPV genotype
Glaxo Smithkline Biologicals SA.	PCT/EP2003/02826 (WO 03/077942)	1351/KOLNP/2004	12.30.2005/ 9.13.2004	<b>203333</b> (4.13.2007)	9.13.2024	-An L1 VLP based vaccine composition containing VLPs of HPV16, HPV 18, HPV 31 and HPV 45. -Vaccine composition further comprising complete or immunologically active fragments of HPV early antigens E1-E8. - Vaccine composition further comprising antigens of other STDs including HIV, HSV and Chlamydia.
Glaxo Group Ltd	PCT/GB2001/03290 (WO 02/08435)	67/MUMNP/2003  1561/MUMNP/2007 (Divisional of 67/MUMNP/2003)	2.4.2005/ 1.16.2003  11.9.2007/ 9.27.2007	<b>214047</b> (1.24.2008)  Pending	1.16.2023	- A synthetic polynucleotide sequence, analogue or fragment codon optimized for E Coli and encoding the mutated amino acid sequences of HPV early antigen E1, E2 for HPV types/ subtypes selected from HPV1-4, 6,7,10,11, 16,18,26-29, 31,33,35,39,49,51,52,56,59,62 and 68. - A p7313Plc backbone based expression vector capable of driving expression of nucleotide sequences claimed in bacterial cells.
Glaxo Smithkline Biologicals SA.	PCT/EP2006/003918 (WO 06/114312)	3957/KOLNP/2007	6.20.2008/ 10.15.2007	Pending		-L1 proteins of HPV 31, 45, 52 -Method to boost immune response to HPV 16, 18 vaccine by using L1 proteins of other HPV subtypes in composition claimed
Smithkline Beecham Biologicals	PCT/EP/2000/08784 (WO 01/0117551)	1471/CHENP/2003  IN/PCT/2002/336/CHE	11.25.2005/ 9.17.2003  N/A/ 3.5.2002	<b>209780</b> (9.6.2007)  <b>202425</b> (4.13.2007)	9.17.2023  3.5.2022	- A vaccine composition comprising HPV 16 L1 VLPs, HPV 18L1 VLPs, Aluminum Hydroxide and 3DMPL. - A vaccine composition for treating or preventing HPV and HSV infections comprising the HSV gS2 antigen and an HPV 6, 11, 16 or 18 L1 antigen and an adjuvant that stimulates TH1 response
Glaxo Smithkline Biologicals SA.	PCT/EP2003/014562 (WO 04/056389)	1108/KOLNP/2005	7.21.2006/ 6.9.2005	Pending		-Use of a vaccine composition comprising HPV 16 and 18 VLPs to prevent infection by other oncogenic types of HPV excluding HPV 16 and 18.
Glaxo Group Ltd	PCT/EP2003/011158 (WO 04/031222)	506/KOLNP/2005	6.9.2003/ 3.24.2005	Pending		-Nucleotide sequence of HPV polypeptides: E1 or E2 from oncogenic HPV subtypes - Expression vector with codon-optimized polynucleotide sequence -Pharmaceutical composition comprising polynucleotides or vector encoding nucleotide sequence
Glaxo Smithkline Biologicals SA.	PCT/EP2002/04966 (WO 02/087614)	1336/KOLNP/2003	1.13.2006/ 10.16.2003	Pending		-A vaccine composition comprising: (a) at least one HIV antigen; and either one or both of (b) at least one herpes HSV antigen and (c) at least one (HPV) antigen selected from L1, L2, E6, E7, or combination thereof.
Smithkline Beecham Biologicals S.A	PCT/EP1998/05285 (WO 99/10375)	1903/MAS/1998	3.4.2005/ 8.24.1998	Pending		HPV 16 or 18 E6 or E7 HPV protein in fusion with Hib, lipoprotein D, or NS I or fragment thereof from Influenza Virus, and LYTA or fragment thereof from <i>S. Pneumoniae</i>
Smithkline Beecham Biologicals S.A	PCT/EP2000/08728 (WO 01/17550)	IN/PCT2002/335/CHE	3.4.2005/ 3.5.2002	Pending		-Multivalent combination vaccine including HPV HPV (L1, L2, E6, E7) antigens, EBV (gp 350) HBV (Sag), Hepatitis A (HM-175 strain) HSV 2 gD VZV antigen (gpl), HCMV antigen (gB685, pp65), <i>Toxoplasma gondii</i> antigen (SAG1 or TG34)

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Smithkline Beecham Biologicals S.A	PCT/EP1998/08563 (WO 99/33868)	IN/PCT2000/116/CHE	3.4.2005/ 6.13.2000	Pending		-A vaccine composition of HPV E6 or E7 proteins or fusion of above antigens with others including Hib, lipoprotein D, NS I, Influenza Virus, and LYTA of <i>S. Pneumoniae</i>
Merck & Co. Inc	PCT/EP2004/008677 (WO 04/084831)	4036/DELNP/2005	8.31.2007/ 9.8.2005	Pending		-Codon-optimized nucleic acid sequence encoding HPV 31 L1 and codon-optimized for expression in yeast strains including ( <i>s. cerevisiae</i> and <i>p. pastoris</i> ) -Vector and host expressing nucleic acid claimed -VLPs of recombinant HPV31 L1 or L2 proteins or combinations produced in yeast. -Methods for producing VLPs in yeast using above nucleotide sequences
Merck & Co. Inc	PCT/US2005/009199 (WO 05/097821)	5998/DELNP/2006	8.24.2007/ 10.16.2006	Pending		-Codon optimized nucleic acid of HPV 52 L1 for expression in yeast including <i>s. cerevisiae</i> , and <i>p. pastoris</i> . -VLPs of HPV 52 L1, L2 or combination produced in yeast -Method of producing HPV 52 L1 or L2 or combination VLPs in yeast
Merck & Co. Inc	PCT/US2004/037372 (WO 05/047315)	2930/DELNP/2006	8.10.2007/ 5.22.2006	Pending		-Codon optimized nucleic acid of HPV 58 L1 for expression in yeast ( <i>s. cerevisiae</i> , <i>h. polymorpha</i> , <i>p. pastoris</i> , <i>k. fragilis</i> , <i>k. lactis</i> , <i>s. pombe</i> ) -VLPs of HPV 58 L1, L2 or combination - Method of producing HPV 58 L1 or L2 or combination VLPs in yeast
Indian Immunologicals Ltd	PCT/IB2005/001725 (WO 05/123762)	131/CHENP/2007	8.24.2007/ 1.12.2007	Pending		-HPV 16 L1 nucleic acid sequence codon optimized for expression in prokaryotic organism <i>e. coli</i> , <i>shigella</i> , <i>lactobacillus</i> , <i>mycobacteria</i> , <i>lysteria</i> , or <i>salmonella</i> attenuated strains <i>s. enterica serovar</i> , <i>s. typhimurium</i> , <i>s. typhi</i>  -Attenuated strain of micro-organism expressing codon optimized HPV capsid protein from PV 16, 18, 31, 45 - Method For improving immunogenicity of a prokaryotic microorganism, specifically salmonella against HPV 16
University of Cape Town, South Africa	PCT/IB2002/03531 (WO 03/018623)	00831/DELNP/2004	4.27.2007/ 3.31.2004	<b>221817</b> (7.7.2008)	3.31.2024	- Modified nucleotide sequences encoding HPV16,11 L1 proteins for producing VLPs in plant cells where the plant is <i>Nicotiana Benthamiana</i> -VLPs produced by this method for use in a vaccine to treat or prevent HPV infections in human.
Wyeth Holdings Corporation	PCT/US2003/031726 (WO 04/030636)	505/KOLNP/2005	2.24.2006/ 3.24.2005	<b>220842</b> (6.6.2008)	3.24.2025	- A fusion polypeptide comprising HPV E6 and E7 antigen polypeptides where the E6 antigen has mutations in amino acids 63 or 106 and the E7 antigen has mutations in amino acids 24, 26 or 91. - A nucleotide sequence encoding the above polypeptide
Active Biotech AB	PCT/SE2000/001808 (WO 01/023422)	IN/PCT/2002/00438/CHE	3.4.2005/ 3.21.2002	Pending		-A carrier for introducing HPV major capsid L1 protein which has been intentionally modified to remove major type- specific epitope(s) that cause production of neutralising antibodies and which raises a protective immune response cross-reactive towards two or more of the group of HPV-L1 proteins comprising L1 proteins of HPV-16, HPV-18, HPV-31 and HPV- 45.
Government of the US (NIH) John Hopkins University	PCT/US2006/003601 (WO 06/083984)	6219/DELNP/2007	8.31.2007/ 8.9.2007	Pending		-A method for inducing broadly cross- neutralizing antibodies against cutaneous and mucosal HPV types in humans comprising by administering immunogenic N terminal peptides of L2 protein