

## Human Papillomavirus Type 49, a Type Isolated from Flat Warts of Renal Transplant Patients

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The cloning and characterization of the genome of human papillomavirus type 49 (HPV-49) is described. The viral DNA, which is most closely related to the DNAs of HPVs seen in patients with epidermodysplasia verruciformis, was aligned to the HPV-5 genome by electron microscopic analysis of heteroduplexes between the cloned viral DNAs.

A novel human papillomavirus (HPV), HPV type 49 (HPV-49), was identified in the DNA extracted from pooled flat warts of a Polish renal transplant patient, using relaxed hybridization conditions ( $T_m - 40^\circ\text{C}$ ) and an HPV-5 DNA probe. The whole viral genome was cloned in *Escherichia coli* after insertion in plasmid pGEM4, using its unique

1) was confirmed by determining the nucleotide sequence around the cloning site. In the sequenced L1 region (309 nucleotides), HPV-49 shares 74% of its base pairs with HPV-5 DNA, corresponding to 78% identical amino acids. HPV-49 was searched for in a series of specimens of cutaneous benign lesions from 134 patients, including 51

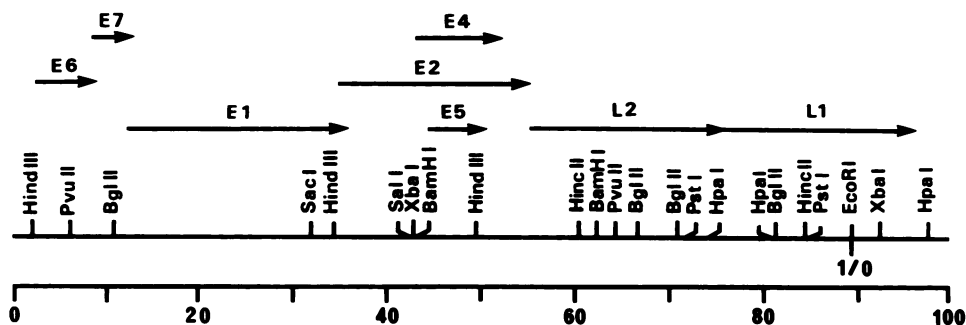


FIG. 1. Physical map of HPV-49 DNA. The unique *EcoRI* site has been taken as the origin. The endonucleases that do not cleave HPV-49 are *AvaI*, *BglII*, *PvuI*, and *SmaI*. The map has been aligned with the map of the ORFs of HPV-5 (2).

*EcoRI* site. No cross-hybridization was observed between HPV-49 DNA and the DNAs of the known HPV types under stringent conditions ( $T_m - 10^\circ\text{C}$ ). However, under nonstringent conditions ( $T_m - 40^\circ\text{C}$ ), significant cross-hybridization was detected with the DNAs of all the HPVs specific for epidermodysplasia verruciformis (EV) (1). Electron microscope analysis of heteroduplex molecules formed between HPV-49 and HPV-5 DNAs, at  $T_m - 36^\circ\text{C}$ , permitted the alignment of the physical map of HPV-49 with the map of the open reading frames (ORFs) of HPV-5 (2) (Fig. 1). The less-conserved regions in the HPV-49 and HPV-5 genomes correspond to the long control region, ORF E6, the middle part of ORF E1, and ORF E4. The localization of the *EcoRI* site in a region corresponding to the 3' end of ORF L1 (Fig.

immunosuppressed patients and 35 patients suffering from EV, of skin premalignant lesions from 64 patients, and of invasive skin carcinomas from 48 patients. HPV-49 was detected only in the flat warts of two additional Polish renal transplant patients. In conclusion, HPV-49 is an HPV type associated with skin warts, weakly related to EV-specific HPVs, and found so far only in immunosuppressed patients.

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### LITERATURE CITED

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