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OBJECTIVES: To investigate HLA class I allele frequencies in a Kenyan commercial sex worker (CSW) cohort, and to examine HIV-1 specific cytotoxic T lymphocyte (CTL) responses directed against epitopes derived from locally prevalent clade A virus. **METHODS:** PCR-single strand polymorphism HLA class I typing. Sequencing of novel alleles and examination of their distribution in the CSW cohort, and a low risk HIV uninfected cohort. The peptide-binding motif of a novel class I allele was predicted, and a panel of candidate CTL epitopes was synthesized whose functional significance was examined using ELISpot and Cr release assays. **RESULTS:** Class I HLA-A and B frequencies within the cohort are presented. Two novel class I alleles were found, HLA-B*4415 and HLA-Cw*0407. These two class I alleles were relatively common, both in the CSW cohort (2.1% and 3.3% respectively) and in a cohort of lower risk women (1.9% and 3.8% respectively). Allele HLA-B*4415 restricted CTL responses against a novel epitope (EEKAFSPEV) derived from p24 of clade A HIV-1, and HLA-Cw0407 restricted CTL against a predefined HLA-Cw*0401 gp120 epitope. **CONCLUSIONS:** Multi-epitope vaccine design requires knowledge of HLA class I distribution and HIV CTL epitope characterization in potential target populations. The description of two novel HLA class I alleles at high frequency in this high risk Kenyan CSW cohort suggests that HLA mapping of vaccine cohorts and subsequent characterization of local CTL epitopes will be warranted prior to vaccine trials.