Captions for supplementary videos:

Video S1: 3-D OCM image stack of a normal cervix. This video shows a stack of cross-sectional OCM images of normal cervical epithelium and stroma. Flat epithelial cells exhibited layered mesh-like structure (e.g. epithelial cells), and the OCM signal was attenuated with depth. The boundary between epithelium and stroma was clearly visible. This video corresponds to Figure 2A.

Video S2: 3-D OCM image stack of the squamocolumnar junction (SCJ). This video shows a stack of cross-sectional OCM images demonstrating features at the SCJ. The squamous epithelium displayed mesh-like layered structure, while the columnar epithelium showed metaplastic changes. A Nabothian cyst at SCJ was clearly visible. This video corresponds to Figure 2E.

Video S3: 3-D OCM image stack of ectropion. This video shows a stack of cross-sectional OCM images demonstrating representative features of cervical ectropion. Typical epithelial structure was replaced by a single layer of columnar cells. Epithelium and stroma formed a regular papillary or glandular structure with sharp boundaries. This video corresponds to Figure 2G.

Video S4: 3-D OCM image stack of Condyloma. This video shows a stack of cross-sectional OCM images demonstrating features of koilocytotic cells, a state of HPV infection, which have enlarged and hyperchromatic nuclei, and irregularly shaped cytoplasmic halos. This video corresponds to Figure 2M.

Video S5: 3-D OCM image stack of LSIL with squamous metaplasia. This video shows a stack of cross-sectional OCM images demonstrating features of cervical LSIL with squamous metaplasia. 3-D morphologic changes of the gland with squamous metaplasia can be clearly seen. This video corresponds to Figure 2O.

Video S6: 3-D OCM image stack of HSIL. This video shows a stack of cross-sectional OCM images demonstrating features of cervical HSIL. Individual epithelial cells were unidentifiable. Over half of epithelium lost layered architecture and exhibited hypo-scattering features. The interface between epithelium and stroma was still visible in this case. This video corresponds to Figure 3A.

Video S7: 3-D OCM image stack of cervical cancer showing homogeneous features. This video shows a stack of cross-sectional OCM images demonstrating features of cervical squamous cancer. Bulbous nests of invasive tumor tissue were visible on the surface of the sample. The tissue took on a uniform texture within the epithelium. Strong scattering within the tumor tissue limited the light penetration depth. This video corresponds to Figure 3G.

Video S8: 3-D OCM image stack of cervical cancer showing heterogeneous features. This video shows a stack of cross-sectional OCM images demonstrating heterogeneous features of cervical squamous cancer. The epithelium was infiltrated with tumor cells and the formation hyper-scattering fibrous stroma hyperplasia was visible, which gave the sample an irregular appearance. There was a complete loss of layered structure between the epithelium and stroma. This video corresponds to Figure 3I.