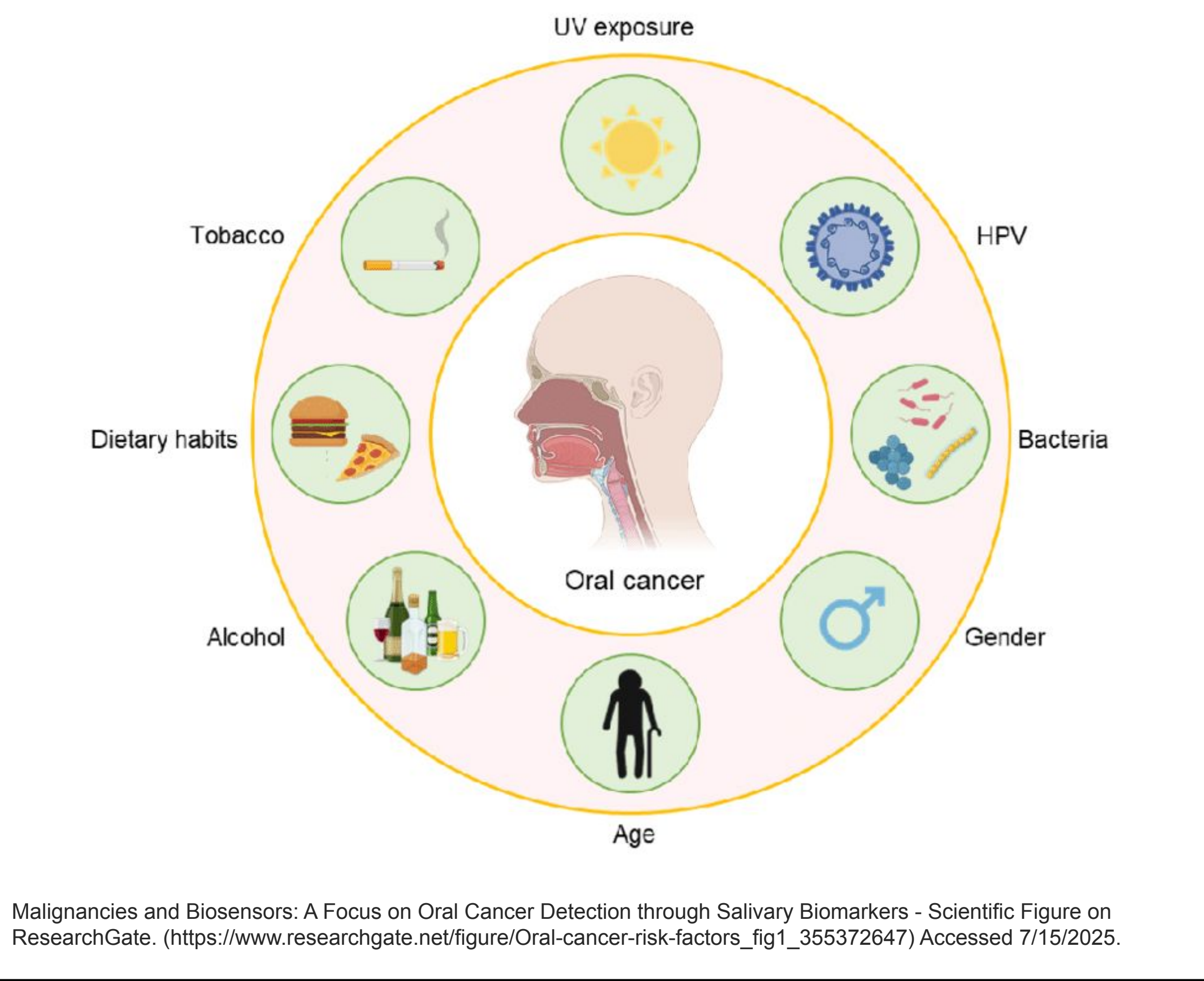


Background and Significance

Oral squamous cell carcinoma (OSCC) is the 16th most prevalent cancer worldwide and represents the most common type of head and neck cancer. Although tobacco and alcohol use are the most often cited risk factors, the human papillomavirus (HPV) is believed to be associated with up to 70% of OSCCs in the United States. HPV has been demonstrated to induce chromosomal instability in various cancers, and similar mechanisms may contribute to the pathogenesis of OSCC.



Hypothesis

HPV-positive SCC090 OSCC cells will exhibit increased aneuploidy compared to HPV-negative CAL27 OSCC cells.

Experimental Design

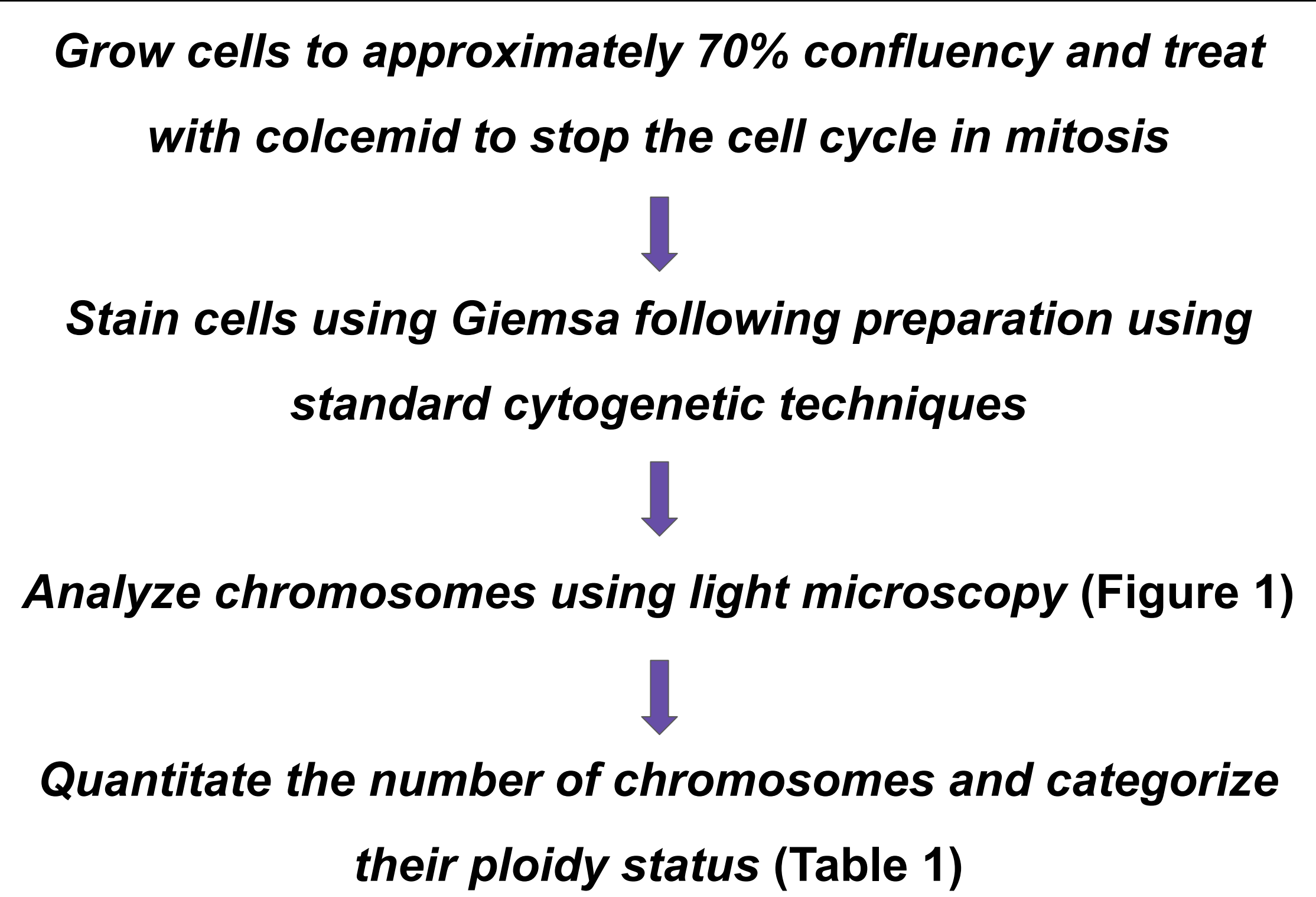


Figure 1: Micrographs of HPV (–) and HPV (+) Cells

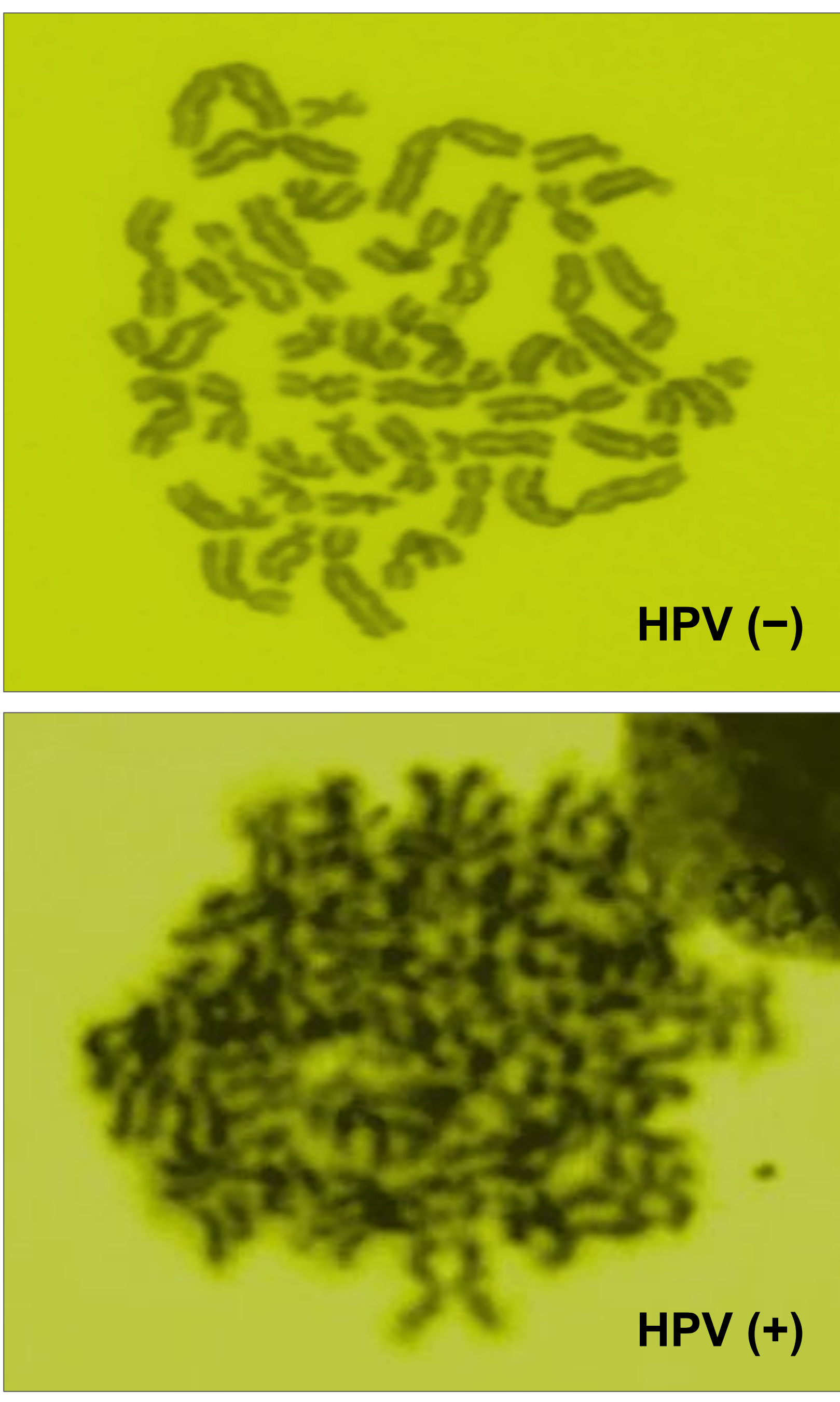
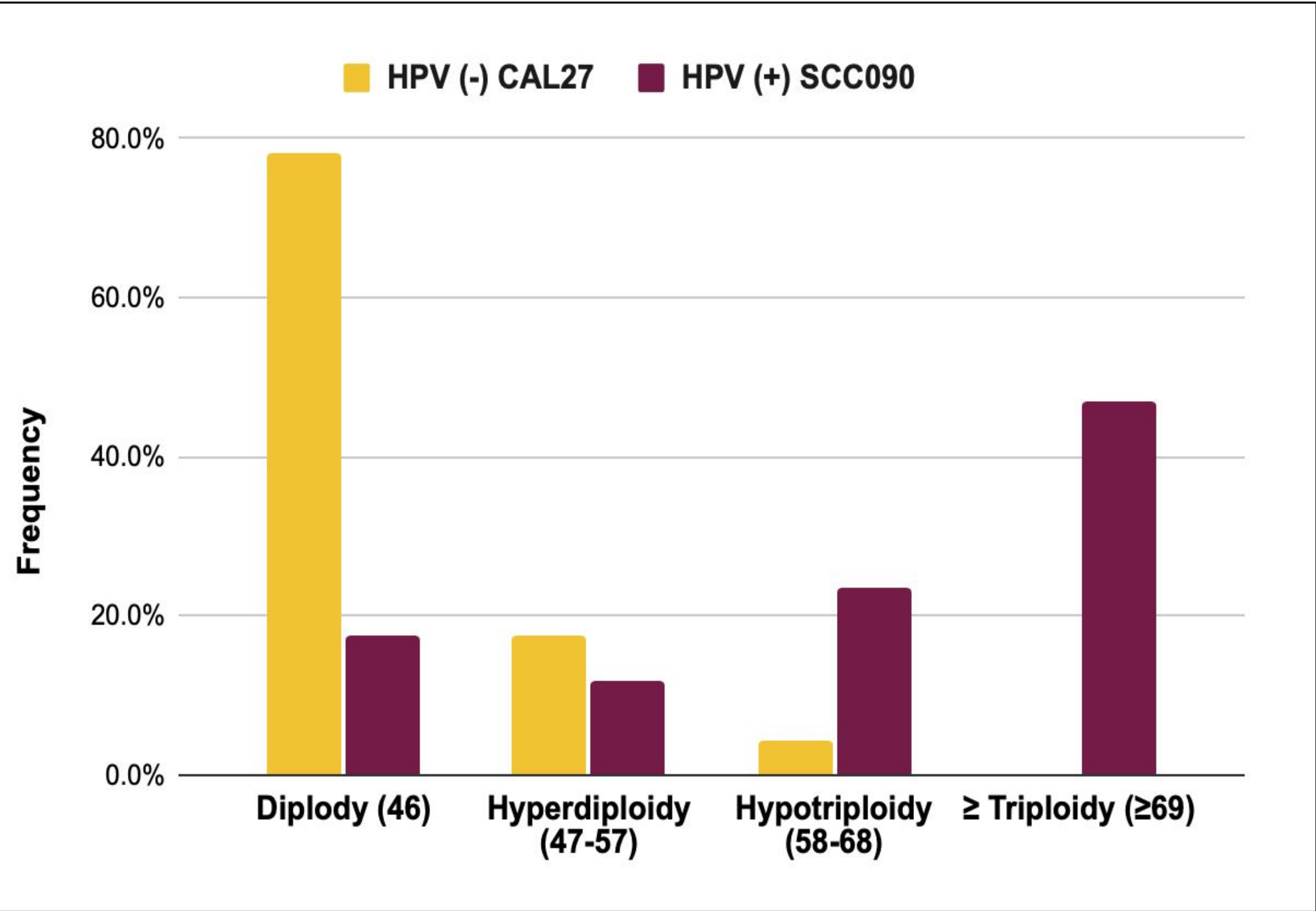


Figure 2: Ploidy Frequency of HPV (–) and HPV (+) Cells



References

• Ferlay J, Ervik M, Lam F, Laversanne M, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2024). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. (<https://gco.iarc.who.int/today>). Accessed 7/14/2025.

• Howe B, Umrigar A, Tsien F (2014). Chromosome preparation from cultured cells. J Vis Exp. 83 (Jan 28): e50203.

• Korzeniewski N, Spardy N, Duensing A, Duensing S (2011). Genomic instability and cancer: Lessons learned from human papillomaviruses. Cancer Lett. 305 (2): pp 113-122.

• Tsien F (2020). Cytogenetics in precision medicine. Clinical Precision Medicine. Ch 1: pp 1-10.

• Centers for Disease Control and Prevention. HPV and Oropharyngeal Cancer. (https://www.cdc.gov/cancer/hpv/basic_info/hpv_oropharyngeal.htm). Accessed 7/14/2025.

• PDQ® Adult Treatment Editorial Board. PDQ Oropharyngeal Cancer Treatment. Bethesda, MD: National Cancer Institute. (<https://www.cancer.gov/types/head-and-neck/patient/adult/oropharyngeal-treatment-pdq>). Accessed 7/14/2025.

Table 1: Ploidy Analysis of HPV (–) and HPV (+) Cells

	HPV (–) CAL27 Cells	HPV (+) SCC090 Cells
Total # of cells analyzed	23	34
Diploidy = 46 (Normal) (%)	18 (78.3%)	6 (17.6%)
Hyperdiploidy = 47-57 (%)	4 (17.4%)	4 (11.8%)
Hypotriploidy = 58-68 (%)	1 (4.3%)	8 (23.5%)
Triplody = 69 (%)	0	3 (8.8%)
Hypertriploidy = 70-80 (%)	0	6 (17.6%)
Hypotetraploidy = 81-91 (%)	0	1 (2.9%)
Tetraploidy = 92 (%)	0	0
Hypertetraploidy = 93-103 (%)	0	0
Ploidy >103 (%)	0	6 (17.6%)

Conclusions

- Overall, HPV (–) CAL27 cells demonstrated predominantly diploid states while HPV (+) SCC090 cells showed dramatically increased chromosomal instability (Figure 2).
- The majority of HPV (+) SCC090 cells exhibited significant aneuploidy, including hypotriploidy, hypertriploidy, and tetraploidy and above.
- Triploid and near-triploid populations were observed exclusively in the HPV (+) cell line.
- Karyotype analysis will be performed to further investigate the nature of HPV-induced chromosomal instability.
- These findings suggest that HPV-mediated chromosomal instability may contribute to oral cancer progression and could have implications for precision-medicine treatment strategies targeting chromosomally unstable tumors.