Quantitative measurements of acetowhitening may provide an adjunct to colposcopy to identify Cervical Intraepithelial Neoplasia 2/3

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OBJECTIVE: Colposcopy as a subjective science can be improved by several adjunctive mechanisms. Acetowhitening, a simple and familiar feature of colposcopy, appears to have the potential to discriminate high-grade cervical lesions from other cervical histologies when quantified. The objective of this study was to investigate the time-dependence of acetowhitening to determine if there are quantifiable kinetic patterns associated with individual cervical histologies.

STUDY DESIGN: A prospective observational study of women attending colposcopy clinic for abnormal cytology was undertaken for an eighth-month period of time. Fifty women completed the study with full cervical visualization, complete optical measurements of the full cervix, recorded biopsy sites, and correlative pathology. The 300 images of each cervix were captured to construct kinetic curves that mapped the acetowhitening intensity as a function of time. Once optimal kinetic features were extracted from the curves they were used to formulate receiver/operator curves (RCO) for the discrimination of CIN 2/3 from the combination of cervical intraepithelial neoplasia grade 1 (CIN 1), immature squamous metaplasia and normal tissue classified as no evidence of disease (NED).

RESULTS: The average age of the population was 37.1 years (SD 12.7). 19.0% of the biopsies had no evidence of disease (NED), 8.6% had immature squamous metaplasia, 27.6% had CIN 1 and 44.8% had CIN 2/3. Discrimination of CIN 2/3 from CIN 1, NED and metaplasia was achieved using a jackknifed linear discriminant analysis resulting in an ROC Q-point of 84%. This Q-point was determined using two acetowhitening kinetic curve features: the slope at 235 seconds after the application of acetic acid and the decaying slope at 45% of the maximum intensity.

CONCLUSION: Quantitative measurements of the kinetic features of the ectocervical acetowhitening process may provide increased discrimination of CIN 2/3 from non-CIN 2/3 tissue relative to colposcopy alone.

Key Words: Acetowhitenning, kinetic patterns, cervical neoplasia, image processing, acetic acid.