Non-Invasive Pre-Screening Approach for Early Detection of the Human Papillomavirus (HPV) to Aid in Cervical Cancer Prevention in Underrepresented Demographics

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Cervical cancer is the fourth leading cause of death for women in the United States. According to the CDC, since the COVID 19 pandemic, the pap-smear screening rates have declined by 80%. The number of minority women lacking access to Human-Papillomavirus screenings is a burgeoning crisis. A National Cancer Institute survey confirmed minority women indicated a lack of access to HPV screenings. This study posits an alternative, non-invasive, and accessible pre-screening method for HPV detection to decrease the growing mortality rate of underprivileged women developing cervical cancer. It was hypothesized that if the swabbing of a menstrual blood samples contains koilocytotic cells with an abnormal concentration of cellular proteins, then a woman's menstrual cycle could detect the 12-15 high risk HPV strains when coated with 3-5% acetic acid with a visual inspection of white coagulations. To confirm the validity of this approach, a licensed pathologist was consulted to better understand the current method of detection, the Papanicolaou Test. The student researcher hosted a public presentation, regarding cervical cancer awareness, in which a survey was distributed and 66.7% of respondents indicated that they did not schedule regular HPV screenings (1-3 years). Using acetic acid (CH3COOH) infused pads (5ml) to detect HPV cells in menstrual simulated-blood with varied sized 3D-printed cervixes were used to simulate BSL-2 experimentation. A prototype HPV pre-screening menstrual self-testing kit that is a non-invasive approach for all women to have access to for earlier detection of HPV strains and preventing cervical cancer from manifesting is being constructed.

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