A Method for Papnicolaou Tests Utilizing a Novel Cytobrush To Reduce Acute Pain and Increase Effective Sample Collection

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Every year, 124 million women receive Papanicolaou exams; and every year 4,000 die from cervical cancer. The root of this disparity lies in the outdated devices used to collect cervical cells, causing vaginal bleeding and ineffective sample collections. Thus, this project's motive was to create a novel cytobrush that accumulates more cells at lower pressures to categorize the cytobrush as "more effective and painless." To accomplish this, the researcher designed a silicone cytobrush inspired by an Aylesbury spatula's shape, including a flexion sensor at the base and extended tip with villi-like protrusions. The goal was simultaneous endocervical and ectocervical cell collection, real-time cytobrush flexion readings, and increased malleability. A Vernier dual-range force sensor was utilized to model a cervix's receptors, inner-cheek epithelial cells to imitate cervical cells in evaluation. The novel cytobrush was then tested against the current clinical method of an Aylesbury spatula and plastic cytobrush in a procedure replicating a Papanicolaou exam via collecting cells on the sensor whilst taking flexion readings and then counting the number of cells collected using a microscope. After the Vernier graphical analysis compiled 10,000 total pressure points, it was determined that the combined method garnered an average of 1135 cells/Newton (SD of 0.166) while the novel cytobrush gathered 4543 cells/Newton (SD of 0.0426), deeming it 4.0007 times more "effective" at an optimal flexion range of 434 microvolts. This device can be used in practice to increase patient comfort and provide live pressure readings to practitioners.

Awards Won:
Fourth Award of $500