AI-Guided Optical Sensors for The Early Detection of Gynecologic Cancers

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Gynecologic cancers are particularly difficult to diagnose. Patient prognosis and quality of life are affected substantially by this problem. We are developing new technologies to improve cancer detection using liquid biopsy and in vivo sensor approaches. With artificial intelligence algorithms, we harnessed the unique optical properties and sensitivity of single-walled carbon nanotubes to develop intelligent optical sensors. We developed platforms to detect multiple cancer biomarkers in both patient biofluids and within the uterine cavity as implantable devices. Applying machine learning algorithms to analyze the optical response of the sensors enabled the precise detection of multiplexed biomarkers. In addition, when implanted in human uteri, the sensors detected the biomarkers and successfully differentiated between benign and malignant cases. These technologies will significantly improve diagnostics and lead to robust, point-of-care technologies for early-stage diagnosis.

References

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