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Early diagnosis of ovarian cancer using e-noses

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We present a diagnostic tool that detects ovarian cancer in ten minutes through analysis of blood plasma gas emissions. Due to diffuse symptoms and no available screening tests, ovarian cancer is normally diagnosed in stage III-IV, with a five-year survival rate of only 4% upon diagnosis in stage IV. Stage I detection results in a much better prognosis, with a 5-year survival rate of 90%. Our approach could significantly improve the outlook for patients receiving the diagnosis. The method is based on an electronic nose coupled with AI. 32 commercial gas sensors are configured in 4 banks with 8 sensors each, operating at different temperatures. Blood plasma is placed into a sample holder which is inserted into the e-nose at the start of a measurement. Data is collected at a sampling rate of 10 Hz for 600 seconds, after which an AI derived classification algorithm based on PCA for dimensionality- and feature reduction and an SVM model provides a positive or negative output. Using 5-fold cross validation, we have obtained a sensitivity of 98% and an overall accuracy of 95 % based on 113 samples, including 87 samples from ovarian cancer patients with conditions ranging from borderline to stage IV.

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