ISGE
GYNECOLOGICAL ENDOCRINOLOGY
THE 18TH WORLD CONGRESS
7-10 MARCH 2018 FLORENCE, ITALY

Sphingomyelins and phosphatidylcholines as diagnostic and prognostic biomarkers of endometrial cancer

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Context: Targeted metabolomics for identification of biomarkers for endometrial cancer.
Objective: To identify disease-related metabolites, their ratios and evaluate their diagnostic/ prognostic potential.
Methods: Targeted metabolomics/ lipidomics approach was used to evaluate metabolomic changes in patients with endometrial cancer compared to controls. Using electrospray ionization–tandem mass spectrometry we quantified 163 metabolites in 126 plasma samples. Step-wise logistic regression procedure was used for constructing diagnostic and prognostic algorithms to separate patients with endometrial cancer from controls and patients with/ without deep myometrial invasion or lymphovascular invasion.
Patients: Prospective case–control study included 126 patients undergoing surgical treatment (61 patients with endometrial cancer; 65 control patients) at the University Medical Centre Ljubljana, Slovenia.
Intervention: Blood collection and quantification of 163 metabolites in plasma samples using electrospray ionization-tandem mass spectrometry.
Main Outcome Measures: Metabolomics alterations that are associated with endometrial cancer, presence of deep myometrial invasion or lymphovascular invasion.
Results: Three single phosphatidylcholines were identified as potential diagnostic biomarkers. A diagnostic model was defined as the ratio between acylcarnitine C16 and phosphatidylcholine PCae C40:1, the ratio between proline and tyrosine, and the ratio between two phosphatidylcholines PCaa C42:0 and PCae C44:5; this provided sensitivity of 85.25%, specificity of 69.23%, and AUC of 0.837. A prognostic model for deep myometrial invasion included the ratio between two hydroxysphingomyelins SMOH C14:1 and SMOH C24:1, and the ratio between two phosphatidylcholines PCaa C40:2 and PCaa C42:6, with sensitivity of 81.25%, specificity of 86.36%, and AUC of 0.857. The model for lymphovascular invasion included the ratio between two phosphatidylcholines PCaa C34:4 and PCae C38:3, and the ratio between acylcarnitine C16:2 and phosphatidylcholine PCaa C38:1, with sensitivity of 88.89%, specificity of 84.31%, and AUC of 0.935.
Conclusions: Endometrial cancer is characterized by altered levels of acylcarnitines, phosphatidylcholines, and sphingomyelins and basic logistic regression enabled the development of algorithms with good diagnostic and prognostic accuracies.

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