

# Endometriosis: a deep insight into the pathology through metabolomics

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## 1. Introduction

Endometriosis is defined as the presence of endometrial tissue outside the uterine cavity, affecting approximately 10% of women in reproductive age, and mostly associated with infertility and/or pelvic pain<sup>1,2</sup>. The current lack of an efficient non-invasive diagnosis method affects the delay between the first symptoms and the identification of the pathology<sup>1</sup>. Therefore, the discovery of a combination of biomarkers measurable in biofluids is essential for a more efficient treatment of patients. Metabolomics appears to be an innovative and powerful tool to obtain a deep insight into this disease.

## 2. Approach

In this study, we applied a NMR-based metabolomics analysis on urine and serum samples obtained from 90 patients with endometriosis (stage I-IV, “endometriotic”) and from 98 normal patients (“controls”). Urines samples were freeze-dried prior to the <sup>1</sup>H-NMR acquisition. Classical metabolomics post-treatment and statistical analysis (PCA and PLS-DA) were performed on NMR spectra.

## 3. Results

The analysis of sera spectral data did not allow a distinction between the metabolic profiles of endometriotic and control patients. However, the analysis of the urine samples revealed a clear separation between “endometriotic” and “control” groups (fig. 1). This distinction is already observable at an early stage of the disease. This analysis led to the identification of relevant changes in some metabolites levels. These changes in the metabolic profile could be linked to some biochemical pathways that seem to be affected by endometriosis. These results could help the comprehension of the occurrence and the evolution of this pathology

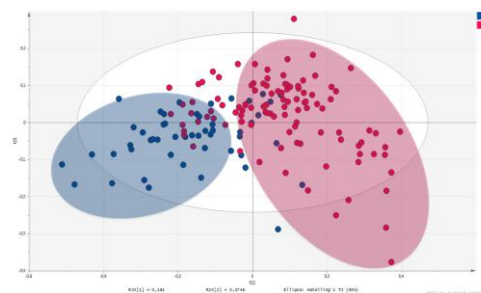


Figure 1. PLS-DA score-plot of urine samples. A good separation is observable between endometriosis (red) and controls (blue) samples.

## 4. Discussion

This study demonstrates that, despite the complexity of this disease, metabolomics is a valuable tool to explore endometriosis. The results obtained by the analysis of urine samples could hold the key to finally unravel endometrial clinical biomarkers

## References

1. Vercellini, P., Viganò, P., Somigliana, E. & Fedele, L. Endometriosis: pathogenesis and treatment. *Nat. Rev. Endocrinol.* **10**, 261–275 (2013).
2. Guo, S. W. Endometriosis and ovarian cancer: Potential benefits and harms of screening and risk-reducing surgery. *Fertil. Steril.* **104**, 813–830 (2015).