



Non-Invasive metabolomic and chemometric analysis of human embryo culture medium at low oxygen pressure.

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STUDY QUESTION

Selecting the best embryo with the greatest potential to implant is the crucial step in all IVF centers. Metabolomic approach of embryo culture medium, together with the morphological criteria, has not produced satisfactory results. One of the major limitations is the technical complexity and cost.

SUMMARY ANSWER

We have not identified any metabolite in the culture medium at low pressures that is correlated with an increase/decrease in the pregnancy rate.

WHAT IS KNOWN ALREADY

Recent randomized controlled trials using commercial instruments failed to show a consistent benefit in improving pregnancy rates when metabolomics is used as an adjunct to morphology (Uyar and Seli, 2014). The High Pressure Liquid Chromatography with Mass Spectrometry (HPLC-MS) data have been analyzed with an approach developed in our group (Marhuenda-Egea et al., 2013) in order to found a relation between the implantation success and the metabolite concentration in embryo culture medium.

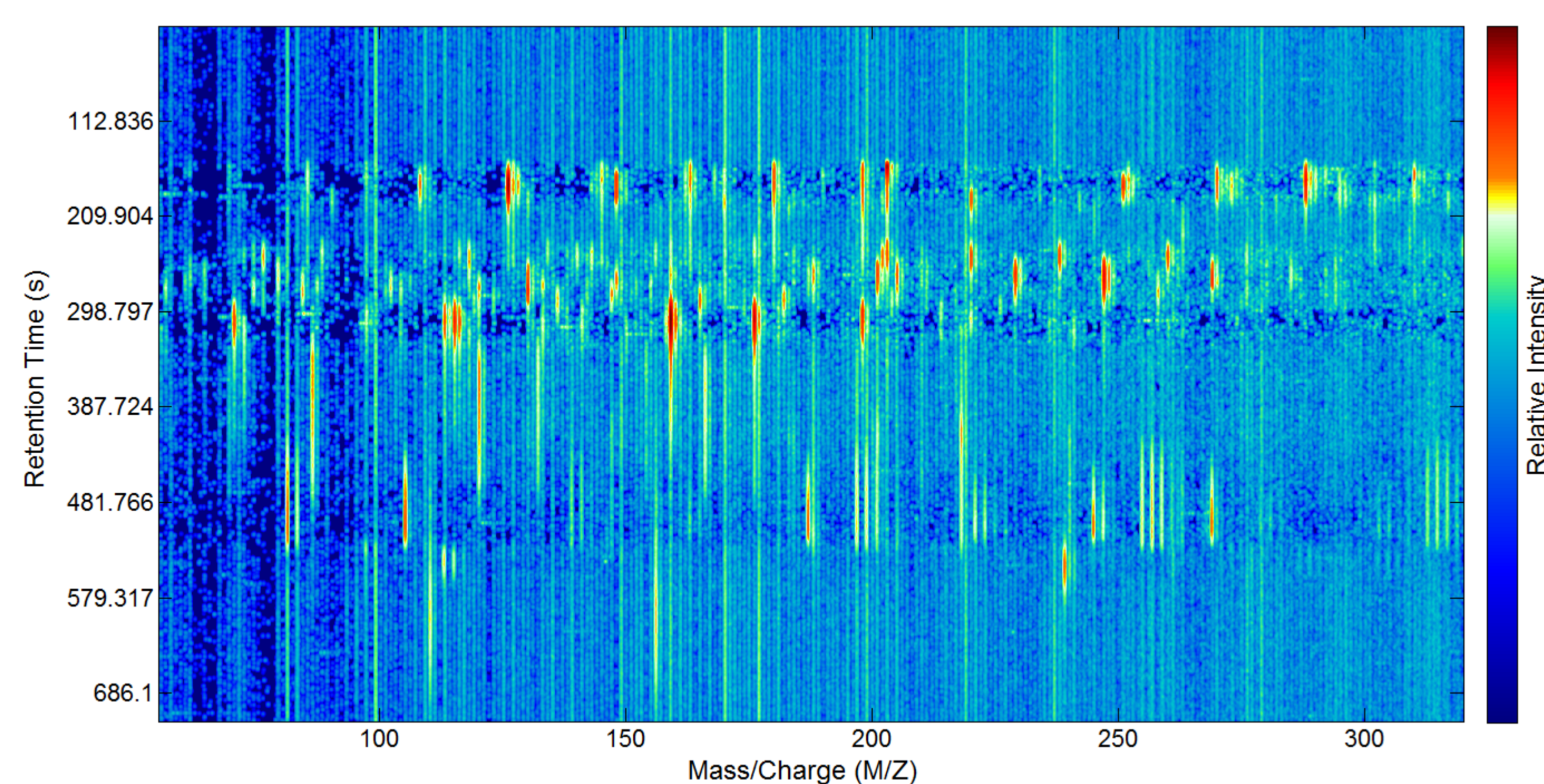


Figure : HPLC-MS data from a sample of culture medium. The signals were assigned to different ions.

STUDY DESIGN

Prospective study. We evaluated the metabolites presented in the culture media at low pressures of 121 embryos coming from 76 patients performed an IVF treatment with oocyte donation in our center during 2013.

MATERIALS AND METHODS

The embryos were cultured individually from day 3 to day 5 in 50 microliters of Blastocyst Medium (Cook Medical, Ireland). The media were collected after embryo transfer and analyzed by HPLC-MS (Marhuenda-Egea et al., 2013). The chemometric models were performed with Robust Principal Component analysis (RobustPCA) (Verboven and Hubert, 2005) for samples from both, non-pregnancy and pregnancy cycles.

MAIN RESULTS AND THE ROLE OF CHANCE

The global live birth rate of the recipients was 51.3%. The scores plot obtained by RobustPCA did not showed differences between the non-pregnancy and pregnancy samples. The distribution of the samples in the scores plot were determined by the loadings of the RobustPCA. These loadings were conditioned by the metabolite concentration.

LIMITATIONS, REASON FOR CAUTION

Although the use of metabolomics as a tool for embryo selection does not provide satisfactory results, the number of cases should be increased in order to check our detection method.

BIBLIOGRAPHY

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WIDER IMPLICATIONS OF THE FINDINGS

It seems that in the group of best reproductive prognosis (oocyte donation) and culture at low pressures which mimics the maternal environment, metabolomics is not useful. It would be interesting to test this analytical method in patients with poor reproductive prognosis like repeated implantation failure or recurrent pregnancy loss. Other steps could be the analysis of the metabolites in the uterus, since in this ambient could be the key to understand the pregnancy success.

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