18th World Congress in Fetal Medicine

# In-vivo performance of microarray sensors for fetal hypoxia-acidosis monitoring

Pla L, Illa M, Berdún S, Dulay S, Rivas L, Miserere S, Samitier J, Mir M, Eixarch E, Gratacós E
BCNatal | Fetal Medicine Research Center (Hospital Clínic and Hospital Sant Joan de Déu), Barcelona, Spain

## Objective

Ultrasound is the gold standard for assessment of fetal hemodynamical changes related to hypoxia-ischemia events, but it has a low sensibility and continuous monitoring cannot be performed. Our objective was to assess the performance of a miniaturized electrochemical device to early diagnose fetal hypoxia-acidosis and to continuously monitor acid-base status under hypoxia-acidosis conditions.

## Methods

Micrometric sensor performance was tested in an adult rabbit (n=15) and in a fetal sheep model (n=8). Devices were placed intramuscularly and arterial catheters were placed in the carotid artery to obtain sequential blood samples to monitor blood pO2 and pH. The hypoxia was induced through ventilatory hypoxia in the adult rabbits, whereas cord occlusion was used in the fetal model. First, a 50% of occlusion was performed, followed by a 100% occlusion. pH and pO2 were the parameters obtained by the sensors and were correlated with blood gas metabolites (EPOC® analyzer).

## Results

In adults, the sensor identified the decrease in pO2 and pH during the hypoxia-acidosis induction, distinguishing normoxia and hypoxia-acidosis conditions. In the fetal model, changes were specially marked in the 100% occlusion phase and, although the ranges on pH and O2 differences under hypoxia-acidosis and normoxia were reduced, our sensor was able to detect differences.

## Conclusion

The developed microarray technology showed a good performance in both models. These results open the opportunity to develop a new generation of fetal monitoring under critical conditions.