

## Evaluation of the Spatial Regulation of Hydrogen Sulphide Producing Enzymes in the Placenta during Labour

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**Abstract :** Background: Labour in human is a complex biological process that involves interactions of neurological, hormonal and inflammatory pathways, with the placenta being a key regulator of these pathways. It is known that uterine contractions and labour pain cause physiological changes in gene expression in maternal and fetal blood, and in placenta during labour. Oxidative and inflammatory stress pathways are implicated in labour and they may cause alteration of placental gene expression. Additionally, in placental tissues, labour increases the expression of genes involved in placental oxidative stress, inflammatory cytokines, angiogenic regulators and apoptosis. Recently, Hydrogen Sulphide (H<sub>2</sub>S) has been considered as an endogenous gaseous mediator which promotes vasodilation and exhibits cytoprotective anti-inflammatory properties. The endogenous H<sub>2</sub>S is synthesised predominantly by two enzymes: cystathionine  $\beta$ -synthase (CBS) and cystathionine  $\gamma$ -lyase (CSE). As the H<sub>2</sub>S pathway has anti-oxidative and anti-inflammatory characteristics thus, we hypothesised that the expression of CBS and CSE in placental tissues would alter during labour. Methods: CBS and CSE expressions were examined in placentas using western blotting and RT-PCR in inner, middle and outer placental zones in placentas obtained from healthy non labouring women who delivered by caesarian section. These were compared with the equivalent zone of placentas obtained from women who had uncomplicated labour and delivered vaginally. Results: No differences in CBS and CSE mRNA or protein levels were found between the different sites within placentas in either the labour or non-labour group. There were no significant differences in either CBS or CSE expression between the two groups at the inner site and middle site. However, at the outer site there was a highly significant decrease in CBS protein expression in the labour group when compared to the non-labour group ( $p = 0.002$ ). Conclusion: To the best of author's knowledge, this is the first report to suggest that, CBS is expressed in a spatial manner within the human placenta. Further work is needed to clarify the precise function and mechanism of this spatial regulation although it is likely that inflammatory pathways regulation is a complex process in which this plays a role.

**Keywords :** anti-inflammatory, hydrogen sulphide, labour, oxidative stress

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