**YEAR 2014/15**

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**INSTITUTION: CAMBRIDGE UNIVERSITY**

**PROJECT TITLE: THE IMPACT OF HYDROGEN SULPHIDE ON VASCULAR SMOOTH MUSCLE DIFFERENTIATION, PLACENTAL MORPHOLOGY AND FETAL GROWTH**

**Brief Resume of your Project’s outcomes for the Society’s Website**: **(no more than 200-250 words)**.

*The title of your project and a brief 200-250 word description of the proposed/completed project. The description should include sufficient detail to be of general interest to a broad readership including scientists and non-specialists. Please also try to include 1-2 graphical images (minimum 75dpi). NB: Authors should NOT include sensitive material or data that they do not want disclosed at this time.*

Intrauterine growth restriction complicates about 15% of human pregnancies, and is often associated with increased placental vascular resistance. Hydrogen sulphide (H2S) is a gaseous signalling vasodilator modulating physiological tone. In the vasculature, H2S is produced from cysteine by the enzyme cystathionine-γ-lyase (CSE). CSE-/- knock-out mice have markedly reduced serum H2S levels, and pronounced hypertension. CSE is expressed in the SMCs of the placental stem villus arteries. CSE expression is reduced in cases of IUGR, as well as in cases of pre-eclampsia accompanied by abnormal umbilical arterial Doppler profiles. Reduced bioavailability of H2S may thus be implicated in placental vasoconstriction. Our aim was to test whether loss of CSE causes fetal growth restriction, placental SMC dedifferentiation, and increased umbilical vascular resistance in CSE-/- knock-out mice. We therefore mated CSE+/- heterozygous mice and collected placental samples from littermates. CSE protein was detected by Western blot and immunohistochemistry in placentas of the CSE+/+ wild type and CSE+/- heterozygote progeny, but was completely lacking in the placentas of CSE-/- knock-out mice. Quantitative analysis of the IHC results revealed a marked reduction in smooth muscle expression of the contractile proteins α-SMC and MHCII in the pericytes of the labyrinthine zone and in the smooth muscle cells of placental vessels in the CSE-/- knock-out mice compared to the CSE+/+ wild types. These results suggest that the CSE-/- knock-out mouse may be a valuable model to investigate the role of H2S in complications of pregnancy.

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