

Targeted Project / AY 2023 -2024

Obstructive sleep apnoea during pregnancy and early origins of heart disease

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Research area: Reproduction

Project outline:

Obstructive sleep apnoea (OSA) is characterized by episodes of intermittent hypoxia (IH), which promote oxidative stress and increase the risk of heart disease in affected patients. In turn, human pregnancy is associated with OSA, which is aggravated by obesity, the rates of which in the UK, including in women of reproductive age, are reaching epidemic proportions. However, the effects of maternal IH due to OSA during pregnancy on the cardiovascular health of the offspring are largely unknown. This project will study the effects of IH in the chicken embryo, an established model system that permits isolation of the direct effects of developmental challenges on the cardiovascular system of the offspring, independent of effects on the mother and/or the placenta.

Fertilised eggs will be exposed to normoxia or IH to model desaturations during OSA (Oxycycler, BioSpherix). At day 19 of the 21-day incubation period, the heart will be isolated and mounted onto a Langendorff preparation to determine effects on cardiac function during basal conditions and in response to a period of ischaemia-reperfusion (IR). Cardiac IR injury will be determined by infarct size. In another cohort of embryos, hearts will be collected for respirometry, or frozen or fixed for molecular and histological analysis, respectively. Embryos will be genotyped for sex to permit sex-dependent analyses. Another group of fertilised eggs will be allowed to hatch, and birds will be raised to adulthood (6 months). At 6 months, experiments performed in the embryo will be repeated in the adult.

BBSRC DTP main strategic theme: Bioscience for an integrated understanding of health

BBSRC DTP secondary strategic theme: Understanding the rules of life