NIHR | Great Ormond Street Hospital Biomedical Research Centre

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Tracing the anatomical origin and developmental processes through which the human fetal kidney releases Amniotic Fluid Stem Cells

It is well known that the amniotic fluid contains stem cells, termed amniotic fluid stem cells (AFSCs), which can be easily collected through amniocentesis'. These stem cells originate from the fetus and can therefore be used for fetal/neonatal regenerative medicine/transplantation, with no chance of rejection. However, there is confusion about their origin or cell identity which hinders clinical applications. We have recently shown that these cells originate somewhere in the fetal kidney. To identify the exact anatomical location and cell type from which the AFSCs originate, we will apply spatial transcriptomics on human fetal tissues collected through our association with the MRC-Wellcome Trust Human Developmental Biology Resource (HDBR). We aim to prove our current model which indicates fetal kidney cells exfoliate into the fetal urine, whereby they are transported to the amniotic fluid. We suspect the formation of AFSCs is triggered by the change in environmental conditions. Functional validation will be conducted to confirm our findings. I will then identify novel markers to improve the isolation of these cells. This work will provide new insights on the different developmental processes involved in the generation of AFSCs, while also significantly improving our understanding of their origin and identity.

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