

TCS/16/37 – Exploiting hepatocyte and endothelial cell interactions to develop scalable and renewable human liver tissue.

Liver disease is the 5th commonest cause of death in the UK. 16,087 people died from liver disease in 2008, a 4.5% increase since 2007 and trends are rising. The only curative option for end-stage and fulminant disease, that meets “Kings College Criteria”, is liver transplantation. However, organ availability cannot meet demand and many patients die waiting for an organ. Those who do receive transplantation require lifelong immunosuppression with increased risks of infection, cancer, renal and cardiovascular disease. As such, there is a clear imperative to provide alternatives to liver transplantation. My proposal focuses on the generation of human liver tissue from pluripotent stem cells and its translation to industry and the clinic. To build and test novel prototype tissue, I have developed an interdisciplinary approach and built a team of researchers and collaborators with expertise in xeno-free cell production, polymer chemistry and tissue engineering. Our preliminary studies suggest that it is feasible to generate 3D liver tissue from research and clinical grade human stem cell lines. I believe with further development the project will deliver an enabling technology, capable of accurately modelling human liver biology “in a dish” and serving as an attractive candidate for cell based therapy.