Dr S. Srinivas
University of Oxford

Student: B. Joyce

Elucidating the molecular mechanisms underlying cell movements during early embryogenesis

During the very early stages of embryogenesis the developing mouse embryo is comprised of three main tissues: Extra-Embryonic Ectoderm, the Epiblast and the Visceral Endoderm (VE) (Figure 1). A subset of VE cells known as the Anterior visceral Endoderm (AVE) initially become induced at the distal tip of the embryo, from where they migrate towards the prospective anterior where they restrict the expression of posterior markers to the opposite side of the embryo. As a result the primitive streak through which gastrulation occurs forms opposite the anterior, generating a correctly positioned anterior-posterior axis and allowing the embryo to continue development.

The process by which AVE cells migrate is poorly understood. We are using a combination of different techniques to elucidate the molecular mechanisms that may facilitate cell movement in the VE. These include the use of embryos with knocked out genes to understand the genetic control of this process as well as chemical inhibition of cellular processes to understand the role of specific proteins and signalling pathways. To analyse the embryos we use confocal microscopy to collect optical sections, which are reconstructed as volume rendered images allowing 3D visualisation of the embryo and the localisation of proteins in cells (Movie 1). Finally we use live imaging of cultured embryos to understand the dynamic nature of the VE and AVE cells.

Our research has given us a greater understanding of the nature of mechanisms underlying cell movements in the VE and could be applied to understanding epithelial cell movements.

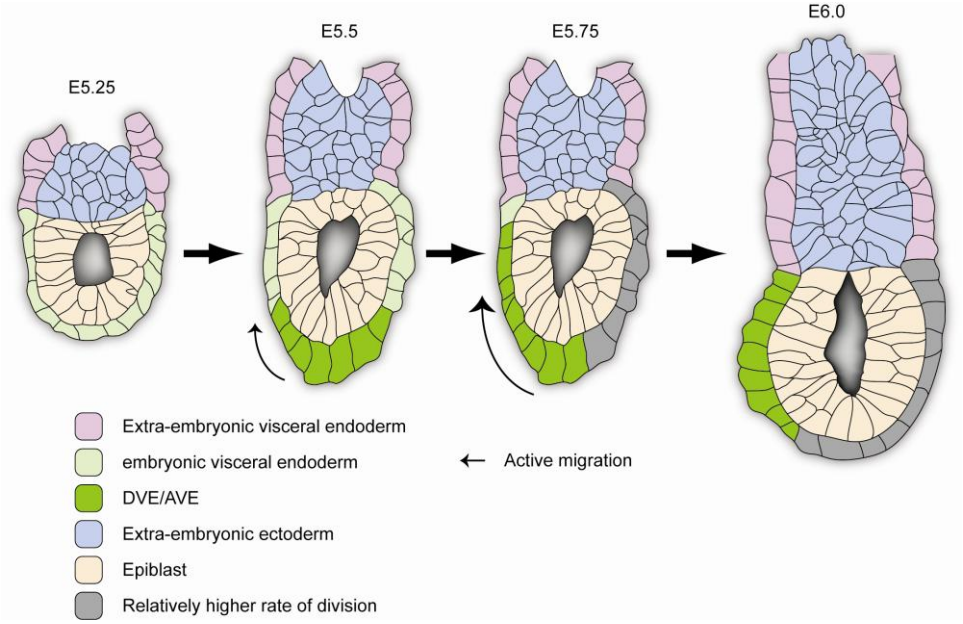

Figure - Stereotypical AVE migration. The AVE moves in a stereotypical manner from the distal region towards the prospective anterior to generate the anterior-posterior axis