**Summer project 2013**

**Towards studying the role of Dact genes in synovial joint formation**

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*Dact* genes encode multi-adaptor proteins that simultaneously control Wnt and Tgfβ signalling [1]. Both signalling systems are known to govern cartilage and bone formation and specifically, the formation of synovial joints [2]. We have identified all of the paralogous *Dact* genes in vertebrates and showed that they arose late in chordate evolution (Sobreira, submitted). Moreover, we showed that the avian members of this gene family, *Dact1* and *Dact2*, are expressed in various types of immature precursor/ stem cells including the undifferentiated cells of the developing joints [3-4]. We therefore hypothesize that *Dact* genes may integrate Wnt and Tgfβ signalling to maintain cells in an undifferentiated state, thereby supporting the formation of joints. To test this hypothesis, we are planning to carry out gain- and loss-of-function experiments.

The objective of the Summer Project funded by the Anatomical Society was to generate the molecular constructs required for the experiments addressing *Dact* function in developing joints. Using the Gateway cloning technology, constructs were generated that allow to build integrateable mis-expression constructs [5]. Moreover the intermediates for constructs that allow to monitor the knockdown of *Dact* function have also been made. Thus, the Anatomical Society summer studentship has put us into the position to now generate the final, fully functional constructs and to perform the planned functional studies, which we hope will in the future not only provide insight into joint development, but also the maintenance of joint health during ageing, and may inform therapeutic approaches to diseases affecting the joints.

**References:**

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