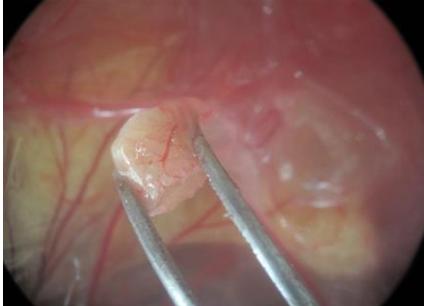


## PREDICTIVE RAPID THROUGHPUT ASSAY FOR BONE, CARTILAGE, ANGIOGENESIS ASSESSMENT AND MATERIAL BIOCOMPATIBILITY FOR REGENERATIVE MEDICINE



*“We provide rapid and predictive bioassays that reduce the need for animals in your regenerative medicine research”*

The development of new cartilage and bone formation strategies offers tremendous therapeutic opportunities in a variety of musculoskeletal diseases. However, assessment of the efficacy of these new approaches, has typically required animal models.

We have developed a number of alternative chick *ex vivo* models, the organotypic and chorioallantoic membrane (CAM) with the capacity to recapitulate, in part, the complex *in vivo* scenario while providing an ethically acceptable framework. The chick CAM provides a unique assay for biomaterial/tissue engineering evaluation given its comparative ease of access, the under-developed immunocompetent system and rapid vascular development. In combination with the organotypic model (bone culture in a dish) these models offer a cost-effective approach prior to evaluation in animal models with the ethical constraints that must be addressed.

### ***Organotypic and chorioallantoic (CAM) models offer the following key advantages:***

- **Sample throughput** – opportunity to screen relatively large numbers of compounds, growth factors and material/cell constructs over an 8-day time frame in an *ex vivo* model
- **Reduction in animal use** – the organotypic and CAM models provide a predictive *ex vivo* approach that reduces use of sentient animal models
- **Cost reduction** – significantly reduced cost in comparison to standard animal models
- **Micro Computed Tomography** allows in-depth analysis of data sets as required
- **75 year history of research** in developmental biology and more recently in tumour, toxicity and angiogenesis biology
- **Diverse applications** – potential to develop custom assays (specific defects)

### **Case studies:**

Moreno-Jiménez *et al.* The chorioallantoic membrane (CAM) assay for biomaterial testing in tissue engineering: a short term *in vivo* preclinical model, *Tissue Engineering* (2018)

Hulsart-Billström *et al.* A surprisingly poor correlation between *in vitro* and *in vivo* testing of biomaterials for bone regeneration: Results of a multicentre analysis, *Eur Cells Mater* (2016)

Moreno-Jiménez *et al.* The chorioallantoic membrane (CAM) assay for the study of human bone regeneration: a refinement animal model for tissue engineering, *Scientific Reports* (2016)

Smith *et al.* The Effects of  $1\alpha, 25$ -dihydroxyvitamin D3 and Transforming Growth Factor- $\beta$ 3 on Bone Development in an *Ex Vivo* Organotypic Culture System of Embryonic Chick Femora, *PLoSone* (2015)

Smith *et al.* A new take on an old story: chick limb organ culture for skeletal niche development and regenerative medicine evaluation, *Eur Cell Mater* (2013)