hydrogel scaffolds to hold the cells in place and provide a structural platform to support new tissue formation. Beyond physically holding the transplanted cells in place, the ideal hydrogel scaffold would boost new blood vessel development to provide vascular support for the transplanted cells. In this study we aim to develop a pro-angiogenic, injectable self-assembling peptide hydrogel (SAPH) which augments the sprouting and migration of endothelial cells. We will also look at the effect of intra-cardiac injection of SAPHs on healthy myocardium to validate it as a delivery vehicle for cells in cardiac cell therapies.

**Methods** Alamar blue and live/dead assays were used to assess the compatibility of Human Umbilical Vein Endothelial Cells (HUVECs) with SAPHs made up of different peptide sequences. Integrin binding motifs RGD, IKVAV, YIGSIR and GFOGER were then added to the peptide and a 3D sprouting assay was used to quantify the effect of the different integrin binding motifs on HUVEC migration and sprouting. To validate the SAPHs as a cardiac cell therapy delivery vehicle 10µl of SAPH was delivered via intra-cardiac injection into the left ventricle of Balb/c mice. A range of parameters were then used to assess cardiac function post gel injection.

**Results** Two different SAPHs, Alpha 2 and Alpha 4, were chosen from Manchester BIOGEL due to their slow degradation kinetics and comparable stiffness to heart tissue (10 kPa and 1 kPa respectively). We found that Alpha 4 was able to support the 3D culture of HUVECs and therefore was used as the base peptide for the addition of different integrin binding motifs. A spheroid based sprouting assay showed Alpha 4 with the combined addition of GFOGER and RGD integrin binding domains increased sprouting and migration of ECs into the hydrogel. We have also shown that the SAPH can be safely delivered to the hearts of mice and remain in situ with no negative effects on cardiac function. Finally, induced pluripotent stem cell derived cardiomyocytes are highly compatible with 3D culture within Alpha 4. We have shown they can be cultured for at least 3 weeks and exhibit the spontaneous beating behaviour within the gel.

**Conclusion** Alpha 4 with the addition of GFOGER and RGD is a promising biomaterial for the delivery of cells such as induced pluripotent stem cell derived cardiomyocytes to the post heart MI.

**Abstracts**

**COMBINED ROLE FOR YAP-TEAD AND YAP-RUNX2 SIGNALLING IN SUBSTRATE STIFFNESS REGULATION OF CARDIAC FIBROBLAST PROLIFERATION**

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Cardiac fibrosis is associated with increased stiffness of the myocardial extracellular matrix (ECM) in part mediated by increased cardiac fibroblast proliferation. However, our understanding of the mechanisms regulating cardiac fibroblast proliferation are incomplete. Cardiac fibrosis is associated with increased stiffness of the myocardial extracellular matrix (ECM). Here we characterise a novel mechanism involving a combined activation of YAP targets RUNX Family Transcription Factor 2 (RUNX2) and TEA Domain Transcription Factor (TEAD). Using collagen-coated polycrylamide hydrogels of tuneable stiffness, we demonstrate that cardiac fibroblast proliferation, quantified using Edu incorporation, is enhanced by interaction with a stiff (50 kPa) ECM compared to a soft (0.5 kPa) ECM (7.02±0.77% on soft vs 33.10±0.52% on stiff; p<0.01). This is associated with activation of the transcriptional co-factor, YAP, indicated by reduced phosphorylation and increased nuclear localisation in cells cultured on stiff substrates. Reporter gene assays demonstrate that stiffness induced activation of YAP significantly enhances the transcriptional activity of both TEAD and RUNX2 transcription factors. Overexpression of an active YAP mutant significantly enhanced TEAD and RUNX2 activity, whereas YAP silencing significantly reduced TEAD and RUNX2 activity. Inhibition of either TEAD or RUNX2, using gene silencing, expression of dominant-negative mutants or pharmacological inhibition, reduces cardiac fibroblast proliferation. Using mutants of YAP defective in TEAD or RUNX2 activation ability, we demonstrate a dual role of YAP-mediated activation of TEAD and RUNX2 for substrate stiffness induced cardiac fibroblast proliferation. Our data highlights a previously unrecognised role of YAP mediated RUNX2 activation for cardiac fibroblast proliferation in response to increased ECM stiffness.

**Young investigators award**

A PREVALENCE AND DIAGNOSTIC SIGNIFICANCE OF NOVEL 12-LEAD ECG PATTERNS FOLLOWING COVID-19 INFECTION IN ELITE SOCCER PLAYERS

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Background Identification of athletes with cardiac inflammation following COVID-19 can prevent exercise fatalities. The efficacy of pre and post COVID-19 infection electrocardiograms (ECGs) for detecting athletes with myopericarditis has never been reported.

Purpose To assess the prevalence and diagnostic significance of novel 12-lead ECG patterns following COVID-19 infection in elite soccer players.

Methods We conducted a multicentre study over a 2-year period involving 5 centres and 34 clubs and compared pre COVID and post COVID ECG changes in 455 consecutive athletes who were infected. ECGs were reported in accordance with the International recommendations for ECG interpretation in athletes. The following patterns were also considered abnormal if they were not detected on the pre