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New research is moving towards the development of algae derived CaP ceramics, as it provides a replenishable source material. The processing techniques used in the conversion process of algae to CaP ceramics can compromise the mechanical integrity of the material. However, there are currently no standard tests available or comparative data in the literature to quantity the change in mechanical properties of the resultant CaP bone filler. Some studies in the literature have applied ASTM C1161 test standard to determine the flexural strength and modulus of coral derived CaP ceramics. However, the granular sizes of the alga after heat treatment are too small to apply this technique. The aim of this study was to establish a protocol to quantify the mechanical properties of porous granular materials. Commercially available CaP filler material was used to validate the mechanical test rig designed. The rig was attached to a Universal Test Machine (Lloyds EZL6000K) compression tester. The compression test results were compared to the change in specific surface area measured by gas porosimetry. After the rig was validated, it was used to quantify the change in mechanical strength of algae after different heat treatments. It found that a decrease in mechanical strength was directly proportional to an increase in heat treatment. The study concluded that the mechanical test rig was a reproducible miniature specimen test method that can be used to quantify the mechanical properties of any CaP ceramics with no size limitations.

**(P 403) Variations in Essential Ion Concentration Across Batches of Foetal Calf Serum May Influence the Expression of Key Adhesion and Regulatory Molecules of Human Umbilical Vein Endothelial Cells.**

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Contemporary *in vitro* cell culture techniques rely heavily on the inclusion of foetal calf serum (FCS). The composition of this undefined mixture of proteins, growth factors and other endogenous regulatory factors fluctuate dramatically, depending on coarse physiological factors of the donor animal. In this study the variation in elemental composition of FCS across donors has been considered and it hypothesised that deviations in elemental composition of sera could influence cell fate and function at a similar magnitude to protein composition.

Elemental composition of FCS from five donors was quantified using inductively coupled plasma mass spectrometry (ICP-MS). Primary human umbilical vein endothelial cells (HUVECs) were systematically cultured using DMEM basal media with 20% foetal calf serum from each of the five donors until confluencey was reached. Expression of surface markers was characterised using immunohistochemistry in conjunction with flow cytometry.

Throughout the five sera significant differences in the elemental composition encompassing a wide range of regulatory ions was identified. In addition to this, across the five donors, statistical variation was observed in a number of molecules critical for cellular adhesion including PECAM-1, ICAM-1 and VCAM-1 and also Von Willeband factor, an indicator of endothelial cell phenotype.

The efficiency of a multitude of enzymes and other key cell signalling pathways is mediated by cofactorial ions within the cell. Elemental analysis of FCS revealed substantial differences in the concentrations of several essential regulatory ions. These sera also demonstrated the capacity to influence cellular phenotype, adhesion and behaviour.

**(P 404) Vascular Development in Microtissues using the Hedgehog Signalling**

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Introduction: In *in vitro*-generated tissues, the development of a vascular system is crucial to rapidly enhance perfusion and survival after implantation [1] and promote pattern formation and tissue development [2]. The hedgehog signalling was lately shown to be essential for endothelial tube formation during embryonic vasculogenesis [3]. We are investigating the use of this signalling pathway in promoting vascular development in 3D microtissues.

Results and discussion: The co-culture of human mesenchymal progenitor cells (hMPC) and human endothelial cells (hUVEC) results in the formation of a primitive vascular network [4]. Sonic hedgehog, a morphogen from the hedgehog family, induced further *in vitro* vascular development including the formation of lumens and tubes in a dose dependent manner. The cellular mechanism is under current investigation and suggests that both hMPC and hUVEC are stimulated and promote tubulogenesis.

Conclusion: This study shows the possibility to use the hedgehog signalling to promote vascular development *in vitro*. The prevascularized microtissues should prove useful to investigate tubulogenesis and as blocks to built vascularized tissues in a bottom-up approach.

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**(P 405) *In Vitro* and *In Vivo* Effect of Platelet Lysate on Osteogenic and Chondrogenic Differentiation of Human Bone Marrow Stromal Cells**

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The heterogeneous population of cells residing in bone marrow, Bone Marrow Stromal Cells, has been a source of osteoprogenitor cells for bone tissue engineering. This process implies the inter-