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## Dynamic stimulation and vasculogenesis

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Vascularization is critical for tissue engineered constructs, in order to provide nutrients, oxygen and establish an initial integration with the host tissue. Studying vascularization *in vitro* remains challenging. Defined culturing conditions that mimic the physiological niche are essential for cell differentiation and survival in 3D scaffolds *in vitro*. The niche comprises both biological and mechanical cues. It has been documented in the literature that mechanical load exerted by bioreactors remarkably enhances culture conditions and cellular metabolism. Since a dynamic environment permits continuous nutrients transport, it prepares scaffolds prior to *in vivo* implantation. Hence, bioreactor technology is a promising strategy for culturing cells in a dynamic environment. In this study, a bioreactor was used to explore the dynamic effect on endothelial and osteogenic genes expression of co-cultured alveolar human osteoblasts (aHOBs) and human umbilical vein endothelial cells (HUVECs) in 3D scaffolds. Cells were seeded in Smart bone® blocks which are composed of bovine bone matrix, biodegradable polymer and cell nutrients with excellent mechanical properties. Scaffolds were cultured in endothelial conditioned media and subjected to pulsating compressive force of  $35 \pm 10$  N at a frequency of 0.1Hz for approximately 72 hours. The molecular qPCR data showed that mechanical stimulation enhanced gene expressions of vascular and early bone markers when compared to seeded scaffolds incubated under static conditions. The findings from this study demonstrated the importance of tailoring the *in vitro* environment for seeded scaffolds in order to better understand the physiological conditions and factors that influence blood vessel formation in implanted scaffolds.

## Biography

Eman Alfayez is currently a full time 3rd year PhD student, Dental Institute King's College London. She is funded by King Abdulaziz University and the Saudi Ministry of Higher Education. She has worked as a resident Dentist in Prince Sultan and King Fahad Armed Forces Hospitals for two years. In addition, holds a demonstrator position in the Oral Biology Division, Oral Basic and Clinical Sciences Department, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia.

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