# *Examining aortic valvular interstitial cells live utilizing Raman spectroscopy*

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Calcified aortic valves experience a significant loss in functionality due to thickening, leaflet fusion and a loss of flexibility. Obstruction to natural flow produces pressure hypertrophy, diastolic dysfunction, myocardial ischemia and without repair or replacement ultimately death. Valvular interstitial cells (VICs) are critical to understanding this phenomenon as they populate the valves and may play a direct role in calcification. When VICs are cultured in vitro they produce nodule like formations staining positive for Alizarin red, a stain commonly used to identify calcium in bone matrices. The question then remains as to the similarity of the matrix composing these nodules and that of bone or naive heart valve calcified legions. Bio-Raman micro-spectroscopy is a rapid, non-invasive, label free method of detecting the molecular content of living systems[1]. Information rich Raman spectra were collected from VICs nodules at various time points in both control and osteogenic media. These spectra are then analysed using univariate and multivariate techniques. Our results show that porcine VICs nodules at 7,14 and 21 days, which stain and are morphologically similar to those previously reported, demonstrate a biomolecular matrices varying greatly from bone nodules grown in vitro tested at similar time points and calcified human aortic cusps.
The nodules formed by VICs may provide information on the calcification happening in vivo however the relationship between these nodules and of other mineralizing tissues and especially calcified naïve valves must be thoroughly investigated using sensitive techniques such as bio-Raman micro-spectroscopy.

References

[1] E. Gentleman, R. Swain, N. Evans, S. Boonrungsiman, G. Jell, M. Ball, T. Shean, M. Oyen, A. Porter, M.M. Stevens, *Nat. Mater.* 8(9), 763-770 (2009)