Dr Daniel Espino BSc, PhD, FHEA, CBiol, MRSB, CEng, MIPEM

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## Qualifications

* PhD in Biomedical Physics & Bio-Engineering, University of Aberdeen, 2005
* BSc, University of Aberdeen, 2001

Daniel is a Senior Lecturer in Biomedical Engineering, and is both a Chartered Biologist and a Chartered Engineer.

Daniel has published around 45 peer-reviewed journal papers and a book chapter in the field of Biomedical Engineering, focusing on connective tissues across the body. He has received funding from EPSRC, the EU and the British Heart Foundation. He has been invited to give seminars, talks and demonstrate research at international meetings in Australia, the Czech Republic, France, Greece, Italy, Malaysia, Switzerland, USA and the UK.

Daniel's main areas of teaching are modules on mechanics, computational modelling and biomedical engineering. His research applies mechanical testing and computational modelling to investigate connective tissues of the body.

### **Research Themes**

Biomedical Engineering, computational modelling and mechanical testing of connective tissues.

### **Research Activity**

#### Cardiovascular research

Daniel is interested in using experimental and computational methods to investigate heart valve mechanics, failure and improved methods for surgical repair. This includes:

* the application of fluid-structure interaction to model heart valves;
* materials testing of natural heart valve components (e.g. chordae tendineae);
* design/development of heart valve simulators for testing repair techniques ex vivo (e.g. of the mitral valve).

#### Musculoskeletal research

Daniel is interested in using experimental and computational methods to investigate the role of connective tissues in musculoskeletal mechanics. This includes:

* materials testing of natural soft tissues (e.g. articular cartilage);
* design/development of apparatus to test stiffness/stability of joints (e.g. the knee joint);
* application of finite element analysis to study tissues (e.g. intervertebral disc modelling).

### **Committees**

* Conference committee member for the World Congress on Engineering, London;
* International program committee member for the 2nd Workshop on 3D Physiological Human, Switzerland;
* Technical program committee member for the International Conference on Science & Engineering in Mathematics, Chemistry and Physics, Indonesia.

### **Editorial Board Member**

* Conference Papers in Biology;
* International Journal of Biological Engineering;
* International Journal of Engineering & Technology;
* Journal of Applied Medical Sciences;
* Open Journal of Orthopedics.

### **Selected Peer-Reviewed Journal Papers**

* Constable M, Burton HE, Lawless BM, Gramigna V, Buchan KG, Espino DM (2018). Effect of glutaraldehyde based cross-linking on the viscoelasticity of mitral valve basal chordae tendineae. Biomedical Engineering Online 17: 93.
* Jewkes R, Burton HE, Espino DM (2018). Towards additive manufacture of functional, spline-based morphometric models of healthy and diseased coronary arteries: in vitro proof-of-concept using a porcine template. Journal of Functional Biomaterials 9: 15.
* Lavecchia CE, Espino DM, Moerman KM, Tse KM, Robinson D, Lee PVS, Shepherd DET (2018). Lumbar Model Generator: a tool for the automated generation of a parametric scalable model of the lumbar spine. Journal of the Royal Society Interface 15: 20170829.
* Lawless BM, Dorrepaal RM, Burton HE, Espino DM, Shepherd DET, Gowen AA (2018). Hyperspectral chemical imaging reveals spatially varied degradation of biomaterials. Acta Biomaterialia 73: 81-89.
* Lawless BM, Espino DM, Shepherd DET (2018). In vitro oxidative degradation of a spinal posterior dynamic stabilisation device. Journal of Biomedical Materials Research: Part B - Applied Biomaterials 106: 1237-1244.
* Sadeghi H, Lawless BM, Espino DM, Shepherd DET (2018). Effect of frequency on crack growth in articular cartilage. Journal of the Mechanical Behavior of Biomedical Materials 77: 40-46.
* Thomas-Seale LEJ, Kirkman-Brown JC, Attallah MM, Espino DM, Shepherd DET (2018). The barriers to the progression of additive manufacture: perspectives from UK industry. International Journal of Production Economics 198: 104-118.
* Baxter J, Buchan KG, Espino DM (2017). Viscoelastic properties of mitral valve leaflets: an analysis of regional variation and frequency-dependency. Journal of Engineering in Medicine 231, 938-944.
* Burton HE, Freij JM, Espino DM (2017). Dynamic viscoelasticity and surface properties of porcine left anterior descending coronary arteries. Cardiovascular Engineering and Technology 8: 41-56.
* Lawless BM, Sadeghi H, Temple DK, Dhaliwal H, Espino DM, Hukins DWL (2017). Viscoelasticity of articular cartilage: analysing the effect of induced stress and the restraint of bone in a dynamic environment. Journal of the Mechanical Behavior of Biomedical Materials 75: 293-301.

### **Invited book chapter**

* Espino DM. 2007. Polymers as replacement materials for heart valves and arteries. In: Biomedical Polymers. M Jenkins (Ed). Woodhead Publishing Ltd, Cambridge, 111-140.