

MIGUEL XAVIER, MSc, PhD

International Iberian Nanotechnology Laboratory (INL) - Braga, Portugal | Mobile: 0044 7521 685 413

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Summary

Biomedical Engineer with 6+ years of experience in research. Adept at cell culture, stem cell biology, microfluidics and *in vitro* epithelial models. Highly-motivated researcher with permanent curiosity for knowledge. Excellent communicator who consistently maintains high standards of professionalism and works well on diverse teams. His PhD focused on the development of label-free microfluidic strategies to isolate skeletal stem cells from human bone marrow. Miguel worked as a post-doctoral fellow at the University of Southampton, developing a dynamic Lung-On-Chip with real-time impedance monitoring for and on a project targeting the identification of novel RNA biomarkers of skeletal stem cells using next generation sequencing strategies based on DropSeq. Currently works at the INL within the Food Processing research group towards the development of a new Gut-On-Chip platform.

Professional Skills

- Rapid prototyping, UV photolithography and soft lithography.
- Cell sorting using deterministic lateral displacement.
- Cell sorting using FACS and MACS.
- Microfluidic impedance cytometry.
- Real-time deformability cytometry.
- Next generation sequencing using DropSeq.
- Cell culture (including cell lines, primary cells and stem cells).
- Immunocytochemistry & fluorescence microscopy.
- Knowledge in TEM, NMR spectroscopy and particle characterisation techniques.
- Competent in MatLab, SPSS, GraphPad, ImageJ, CleWin, SolidWorks, and other software.

Professional Experience

Research Fellow Oct 2018 to Present

INL - International Iberian Nanotechnology Laboratory – Braga, Portugal

Gut-On-Chip: Development of a modular micro-device for simulation of the human gastrointestinal tract

Post-doctoral Research Fellow Oct 2017 to Aug 2018

University of Southampton – Southampton, UK.

Lung-On-Chip: Development of a novel 3D microfluidic assay platform for the assessment of human stem cell-derived epithelial function

DropSeq: Identifying the skeletal stem cell for regeneration - harnessing smart nanoparticles and single cell DropSeq molecular profiling platforms

PhD Student – Marie Curie Early Stage Researcher Sep 2014 to Oct 2017

Faculty of Physical Sciences and Engineering, University of Southampton – Southampton, UK.

European Union's Seventh Framework Programme project – Label-free Particle Sorting (LAPASO).

Thesis title: Label-free, microfluidic characterisation and sorting of skeletal stem cells.

Visiting Researcher April and June 2015

Biotechnology Center, Technische Universität Dresden (TUD) – Dresden, Germany

Real-Time Deformability Cytometry of HL-60, MG-63, whole blood and human bone marrow skeletal stem cells.

Research Fellow Jan 2013 to Aug 2014

Instituto de Engenharia Biomédica (INEB), I3S – Porto, Portugal

Developed a comprehensive and reproducible *in vitro* cell-based model of the blood-brain barrier.

Investigated the impact of PAMAM dendrimers on the survival and differentiation of neural stem cells (NSCs), and assessed PAMAM-mediated transfection of NSCs with a BDNF-coding plasmid.

Visiting Researcher Jan 2014 to Feb 2014

Centro de Química da Madeira, Universidade da Madeira (CQM) – Funchal, Portugal

Chemical modification of PAMAM dendrimers with poly(ethylene glycol) chains and a fluorescent tag and characterisation using ¹H-NMR spectroscopy.

Master Student Jan 2012 to Oct 2012

Instituto de Engenharia Biomédica (INEB)

Thesis title: "Study and development of a model for mimicking the gastric mucosa".

Teaching Experience

Demonstrator – BioNanotechnology course (Univ. of Southampton ELEC 6205) 2014-2017
Soft lithography, surface modification, contact angle, fluorescence microscopy and protein micro-contact printing.

Education

Philosopher's Degree (PhD) Sep 2014 to May 2018
University of Southampton – Southampton, UK.
Thesis title: Label-free, microfluidic characterisation and sorting of skeletal stem cells

Master of Science, BioEngineering Sep 2007 to Oct 2012
Faculdade de Engenharia da Universidade do Porto – Porto, Portugal
Final grade: 16/20 (European Grade A: Top 10% of course students)

High School Degree – Sciences Sep 2004 to Jul 2007
Escola Secundária Martins Sarmiento – Guimarães, Portugal
Final grade: 188/200 (Top 10% of course students)

Languages

- Portuguese (Native).
- English (Cambridge ESOL Certificate of Proficiency in English).
- Spanish (Intermediate knowledge).
- French (Intermediate knowledge).
- German (Basic Knowledge).
- Italian (Basic knowledge).

Publications

Papers in international peer-reviewed journals

“Label-free enrichment of human bone marrow progenitor cells using deterministic lateral displacement”

Miguel Xavier, S. Holm, J. Beech, D. Spencer, J. Tegenfeldt, ROC Oreffo and H. Morgan
Manuscript in preparation

“PAMAM Dendrimers: Blood-Brain Barrier Transport and Neuronal Uptake after Focal Brain Ischemia”

Sofia D Santos, **Miguel Xavier**, Diana M Leite, Débora A Moreira, Rita Castro, Victoria Leiro, Joao Rodrigues, Ana P Pêgo, and Helena Tomas.
Journal of Controlled Release (In Press; Accepted Manuscript).

“Size and dielectric properties of skeletal stem cells change critically after enrichment and expansion from human bone marrow; consequences for microfluidic cell sorting”

Miguel Xavier, María C. de Andrés, Daniel Spencer, Richard OC Oreffo and Hywel Morgan.
J. R. Soc. Interface 2017 14 20170233; DOI: 10.1098/rsif.2017.0233.

“Skeletal stem cell isolation: A review on the state-of-the-art microfluidic label-free sorting techniques”

Miguel Xavier, R OC Oreffo and H. Morgan
Biotechnology Advances, Volume 34, Issue 5, September–October 2016, Pages 908-923

“Mechanical phenotyping of primary human skeletal stem cells in heterogeneous populations by real-time deformability cytometry”

Miguel Xavier, Philipp Rosendahl, Maik Herbig, Martin Kräter, Daniel Spencer, Martin Bornhäuser, Richard O.C. Oreffo, Hywel Morgan, Jochen Guck and Oliver Otto
Integrative Biology, 2016, 8, 616-623.

Abstracts in conference proceedings

“Label-free Microfluidic Sorting of Primary Human Skeletal Stem Cells for Bone Regeneration: A Bio-Physical Characterisation”

Miguel Xavier, Daniel Spencer, Richard OC Oreffo and Hywel Morgan.
The 20th International conference on Miniaturised Systems for Chemistry and Life Sciences. October 2016, Dublin, Republic of Ireland. Pages 242-243.

“Primary human skeletal stem cell bio-physical characterisation for high-purity microfluidic cell sorting and enrichment”

Miguel Xavier, P. Rosendahl, M. Herbig, D. Spencer, J. Guck, O. Otto, R Oreffo and H. Morgan
European Cells and Materials Vol. 31. Suppl. 1, 2016 (page 378). IF: 4.886

“Skeletal stem cell sorting: characterisation of biophysical properties for microfluidic separation applications”

Miguel Xavier, P. Rosendahl, D. Spencer, O. Otto, J. Guck, R Oreffo and H. Morgan
European Cells and Materials Vol. 29. Suppl. 3, 2015 (page 110). IF: 4.886

Curriculum Vitae

“An *in vitro* approach to unravel the modulation of the hypothalamic system by blood-circulating factors”

JP Martins, CJ Alves, E Neto, DM Moreira, Miguel Xavier, D Sousa, I Alencastre and M Lamghari.

2015 IEEE 4th Portuguese Bioengineering Meeting.

Theses

PhD Thesis

“Label-free, microfluidic characterisation and sorting of human skeletal stem cells”

University of Southampton.

Advisors: Professor Hywel Morgan and Professor Richard OC Oreffo

Exam panel: Professor Xize Niu; Dr Mathis Riehle

29th May 2018

MSc Thesis

“Study and development of a model for mimicking the gastric mucosa”

Faculty of Engineering, University of Porto.

Grade: 19/20

8th October 2012

Awarded Grants

Institute for Life Sciences Research Stimulus Fund (£18,277)

Feb-Jul 2018

Development of a Microfluidic Lab-On-a-Chip Device into a Working Prototype for Clinical Application in Bone Tissue Engineering

Oral Communications

“Sorting bone marrow stem cells for skeletal regeneration”

Miguel Xavier, S. Holm, J. Beech, D. Spencer, J. Tegenfeldt, ROC Oreffo and H. Morgan
Southampton Medical & Health Research Conference 2018, University of Southampton

6th-7th June 2018

“Size and deformation-based cell sorting using deterministic lateral displacement – prospects for skeletal stem cell isolation from bone marrow”

Miguel Xavier, S. Holm, J. Beech, D. Spencer, J. Tegenfeldt, ROC Oreffo and H. Morgan
European Workshop on Label-free Particle Sorting, Lund, Sweden.

5th-6th Sep 2017

“Sorting skeletal stem cells from human bone marrow using a novel label-free microfluidic approach”

Miguel Xavier, M. C. de Andres, P. Rosendahl, D. Spencer, M. Herbig, O. Otto, J. Guck, ROC Oreffo and H. Morgan
Southampton Medical & Health Research Conference 2017, University of Southampton

15th June 2017

“Microfluidic characterisation of size, dielectric and mechanical properties of primary skeletal stem cells from human bone marrow for label-free cell isolation”

Miguel Xavier, M. C. de Andres, P. Rosendahl, D. Spencer, M. Herbig, O. Otto, J. Guck, ROC Oreffo and H. Morgan
Gordon Research Seminar – Physics and Chemistry of Microfluidics. Lucca, Italy.

4th June 2017

“Sorting skeletal stem cells from human bone marrow using a label-free microfluidic approach”

Miguel Xavier, M. C. de Andres, P. Rosendahl, D. Spencer, M. Herbig, O. Otto, J. Guck, ROC Oreffo and H. Morgan
PGR Bioengineering Seminar, University of Southampton

24th May 2017

“A lab-on-a-chip to isolate human bone marrow skeletal stem cells for tissue regeneration”

Miguel Xavier, P. Rosendahl, D. Spencer, O. Otto, J. Guck, ROC Oreffo and H. Morgan
Centre for Human Development, Stem Cells and Regeneration Seminars

20th February 2017

“A Lab-on-a-Chip to Isolate Stem Cells for Bone Regeneration”

Miguel Xavier

Invited speaker at Pint of Science Tech Me Out at The Mitre Pub, Southampton, UK.

24th May 2016

“Label-free Skeletal Stem Cell Sorting from Human Bone Marrow”

Miguel Xavier, P. Rosendahl, D. Spencer, O. Otto, J. Guck, ROC Oreffo and H. Morgan
Centre for Human Development, Stem Cells and Regeneration Seminars

14th March 2016

“In-Vitro Modelling the Blood-Brain Barrier: A Tool for Assessing the Potential of PAMAM dendrimers as Vectors to the Central Nervous System”

Miguel Xavier, D. Leite, P. Granja, H. Tomás and A. Pêgo
1st CQM Annual Meeting, Funchal, Portugal

1st February 2014

“Gene/Drug Delivery to the Central Nervous System”

Miguel Xavier, D. Leite, P. Granja, H. Tomás and A. Pêgo
Invited speaker at V Symposium on BioEngineering, Porto

15th November 2013

“Regenerative Medicine”

Miguel Xavier

Invited speaker at E. S. Martins Sarmiento, Guimarães, Portugal

6th July 2012

Poster Communications

- “Marker-free, microfluidic characterisation and sorting of human skeletal stem cells”**
Miguel Xavier, S. Holm, J. Beech, D. Spencer, J. Tegenfeldt, ROC Oreffo and H. Morgan
 EMBL conference – Microfluidics 2018. Heilderberg, Germany. 15th-17th July 2018
- “Microfluidic, label-free skeletal stem cell sorting from human bone marrow”**
Miguel Xavier, S. Holm, J. Beech, D. Spencer, J. Tegenfeldt, ROC Oreffo and H. Morgan
 Microfluidics for Analytical Chemistry. Southampton, UK. 1st February 2018
- “A microfluidic device to sort primary human skeletal stem cells from human bone marrow based on cell size and deformation”**
Miguel Xavier, M. C. de Andres, P. Rosendahl, D. Spencer, J. Guck, O. Otto, ROC Oreffo and H. Morgan
 Precision Cancer Medicine: Forefront Technologies at the Clinical Interface, Southampton, UK. 14th Sep 2017
- “Microfluidic characterisation of size, dielectric and mechanical properties of primary skeletal stem cells from human bone marrow for label-free cell isolation”**
Miguel Xavier, M. C. de Andres, P. Rosendahl, D. Spencer, M. Herbig, O. Otto, J. Guck, ROC Oreffo and H. Morgan
 Gordon Research Conference – Physics and Chemistry of Microfluidics. Lucca, Italy. 4th-9th June 2017
- “Engineering a Microfluidic Lab-on-a-Chip Device to Isolate Human Bone Marrow Stem Cells for Bone Regeneration”**
Miguel Xavier, P. Rosendahl, M. Herbig, D. Spencer, J. Guck, O. Otto, R Oreffo and H. Morgan
 STEM for Britain Competition 2017
 House of Commons, London, United Kingdom. 13th March 2017
- “Label-free Microfluidic Sorting of Primary Human Skeletal Stem Cells for Bone Regeneration: A Bio-Physical Characterisation”**
Miguel Xavier, Daniel Spencer, Richard OC Oreffo and Hywel Morgan.
 The 20th International conference on Miniaturised Systems for Chemistry and Life Sciences. October 2016, Dublin, Republic of Ireland. 9th-13th October 2016
- “Primary human skeletal stem cell bio-physical characterisation for high-purity microfluidic cell sorting and enrichment”**
Miguel Xavier, P. Rosendahl, M. Herbig, D. Spencer, J. Guck, O. Otto, R Oreffo and H. Morgan
 Tissue Engineering and Regenerative Medicine Society (TERMIS-EU) 2016, Uppsala, Sweden June/July 2016
- “A Lab on a Chip to Isolate Human Skeletal Stem Cells for Bone Regeneration.”**
Miguel Xavier, P. Rosendahl, D. Spencer, O. Otto, J. Guck, ROC Oreffo and H. Morgan
 Lab Visit of Her Royal Highness the Duchess of Cornwall, Southampton, UK 11th February 2016
- “Skeletal stem cell sorting: characterisation of biophysical properties for microfluidic separation applications”**
Miguel Xavier, P. Rosendahl, D. Spencer, O. Otto, J. Guck, ROC Oreffo and H. Morgan
 Tissue and Cell Engineering Society (TCES) 2015, Southampton, UK 19th-21st July 2015
- “Poly(amidoamine) dendrimers as vectors for gene and drug delivery to the central nervous system.”**
Miguel Xavier, D. Leite, R. Castro, P. Granja, H. Tomás and A. Pêgo
 1st LAPASO Conference, Lund, Sweden 24th-27th June 2014
- “Gene/Drug Delivery to the Central Nervous System”**
Miguel Xavier, D. Leite, P. Granja, H. Tomás and A. Pêgo
 2nd International Symposium in Applied Bioluminescence, Porto, Portugal 3rd October 2013
- “New Promises on Gene Therapy: Exploring the Effect of PAMAM-NH2 Dendrimers on Neural Stem Cells”**
 D. Leite, **Miguel Xavier**, A. R. Ferreira, I. Amaral, P. Granja, H. Tomás and A. Pêgo
 INEB 2nd Summer Science Club, Porto, Portugal July 2013
- “Gene/Drug Delivery to the Central Nervous System: Overcoming the Blood-brain Barrier”**
Miguel Xavier, D. Leite, P. Granja, H. Tomás and A. Pêgo
 INEB 2nd Summer Science Club, Porto, Portugal July 2013
- “Study and Development of a Model for Mimicking the Gastric Mucosa”**
Miguel Xavier, A. F. Araújo, B. Sarmiento, R. Seruca and P. Granja,
 6th Encontro de Investigação Jovem da UP, Porto, Portugal 13th-15th February 2013
- “Study and Development of a Model for Mimicking the Gastric Mucosa”**
Miguel Xavier, A. F. Araújo, B. Sarmiento, R. Seruca and P. Granja,
 IV Symposium on BioEngineering, Porto, Portugal 23rd-24th November 2012

Merit Awards

Gold Medal for Excellence in Engineering by a Young Engineer STEM for Britain Competition 2017 https://www.southampton.ac.uk/medicine/news/2017/03/bone-research-winner.page	March 2017
Winner of the 3-Minute Thesis Faculty Competition Faculty of Physical Sciences and Engineering, University of Southampton https://www.youtube.com/watch	March 2017
Honourable Mention to Team FedOx Miguel Xavier , Catarina Costa Moura, Antonio de Grazia, Gianluca Cidonio and Estrela Neto TERMIS-EU 2016 Business Plan Competition - Final (https://www.southampton.ac.uk/ifls/news/2016/07/22-termis-european-finals.page)	July 2016
Best Science Student Award Associação dos Antigos Estudantes do Liceu de Guimarães.	2007
Best Mathematics Student Award Associação dos Antigos Estudantes do Liceu de Guimarães.	2007
Merit and Excellence Award Escola Secundária Martins Sarmento	2007

Oral communication awards

Best Oral presentation European Workshop on Label-free Particle Sorting, Lund, Sweden. https://www.southampton.ac.uk/chdscr/news/2017/09/lapaso-conference.page?	September 2017
Best Oral presentation Southampton Medical & Health Research Conference 2017, University of Southampton https://www.southampton.ac.uk/chdscr/news/2017/06/conference-awards.page	June 2017

Poster communication awards

Best Poster presentation Precision Cancer Medicine: Forefront Technologies at the Clinical Interface, Southampton, UK.	September 2017
Best Poster Award "Gene/Drug Delivery to the Central Nervous System: Overcoming the Blood-brain Barrier". INEB 2nd Summer Science Club	July 2013

Travel awards

TCES travel fellowship to present at TERMIS-EU 2016	June 2016
Funding to present at TERMIS-EU 2016 Business Plan Competition Awarded to Team FedOx (Miguel Xavier , C.C. Moura, A. de Grazia, G. Cidonio and E. Neto) by the Institute for Life Sciences, University of Southampton.	June 2016
Funding to present at TERMIS-EU 2016 Business Plan Competition Awarded to Team FedOx (Miguel Xavier , C.C. Moura, A. de Grazia, G. Cidonio and E. Neto) by the Southampton Opportunity Fund.	June 2016
Funding to present at TERMIS-EU 2016 Business Plan Competition Awarded to Team FedOx (Miguel Xavier , C.C. Moura, A. de Grazia, G. Cidonio and E. Neto) by the University of Southampton Education Enhancement Fund.	June 2016

Outreach

Southampton Pint of Science Festival Event Manager	Jan to May 2018
Science and Engineering Festival University of Southampton	March 2016 & 2017
Open day – Degree in Electronic Biomedical Engineering Lab demonstrations University of Southampton	July & Sep 2016
Photolithography Experiments for High school students University of Southampton	5th July 2016
A Engenharia Biomédica num Quarteirão de Histórias Mercado Bom Sucesso, Porto, Portugal.	June 2014
O INEB vai à Escola Escola Camilo Castelo Branco, Famalicão, Portugal	April 2014

References

Dr. Catarina Gonçalves (PhD) – Supervisor at INL INL - International Iberian Nanotechnology Laboratory – Braga, Portugal E-mail: catarina.goncalves@inl.int	Oct 2018 to Present
Professor Hywel Morgan (PhD) – PhD Advisor Electronics and Computer Sciences, University of Southampton – Southampton, United Kingdom. E-mail: hm@ecs.soton.ac.uk	Sep 2014 to Present
Professor Richard Oreffo (PhD) – PhD Advisor Institute of Developmental Sciences, University of Southampton – Southampton, United Kingdom. E-mail: roco@soton.ac.uk	Sep 2014 to Present
Dr. Ana Paula Pêgo (PhD) – Supervisor at INEB, I3S Instituto de Investigação e Inovação da Universidade do Porto (I3S) – Porto, Portugal. E-mail: apego@ineb.up.pt	Jan 2013 to Aug 2014
Dr. Pedro L. Granja (PhD) – MSc thesis Advisor Instituto de Investigação e Inovação da Universidade do Porto (I3S) – Porto, Portugal. E-mail: pgranja@ineb.up.pt	Jan 2012 to Oct 2012
Dr. Bruno Sarmento (PhD) – MSc thesis Advisor Instituto de Investigação e Inovação da Universidade do Porto (I3S) – Porto, Portugal. E-mail: bruno.sarmiento@ineb.up.pt	Jan 2012 to Oct 2012