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BÁRBARA B. S. MENDES

TOPICS OF RESEARCH

Development and characterization of human-based nanocomposite materials. Control over biomolecules spatiotemporal delivery. Modulation of the cellular physical and chemical three-dimensional microenvironment to guide stem cell fate.

BACKGROUND

Synthesis and fabrication of materials. Materials characterization: mechanical and physicochemical properties, and proteins delivery profile. Production and characterization of solid lipid nanoparticles: size and zeta-potential analysis. Cell culture and characterization: immunofluorescence, cell viability, proliferation and differentiation analysis. Processing techniques: lyophilization, bioprinting and microfluidics.

SOFT SKILLS

Elected member of i3Bs Institute Council. Founder member of a team of students ('PhDynamics') that are responsible for science dissemination.

EDUCATION

2015-2020 **PhD in Tissue Engineering, Regenerative Medicine and Stem cells**, *Summa cum laude*, I3Bs research group, Universidade do Minho, Portugal.

PhD thesis entitled "Micro/Nano-structured hydrogels based on platelet lysate for tissue engineering and regeneration" under supervision of Prof. Manuela E. Gomes and Dr. Rui M. A. Domingues (I3BS, U. Minho)

International collaboration: Visitor Researcher in Prof. Jason Burdick group at University of Pennsylvania, USA.

2012-2014 **Master in Biomedical Engineering**, Universidade do Porto, Portugal.

Master thesis entitled "Development and characterization of a co-culture two-dimensional blood-brain barrier for the study of nanoparticle permeation" under supervision of Prof. Bruno Sarmento (i3s, U. Porto) and Prof. Domingos Ferreira (FFUP, U. Porto)

2009-2012 **Bachelor in Biomedical Sciences**, Universidade da Beira Interior, Portugal.

APPOINTMENTS

Representative of the Post-doc community at CEDOC, Nova Medical School (2020 – Present)

Representative of the PhD students in the i3Bs Institute Council (2018-2019).

Fundação para a Ciência e Tecnologia PhD fellowship, PD/BD/113807/2015, (2015-2019).

PUBLICATIONS

INTERNATIONAL JOURNALS WITH PEER-REVIEW

B. B. Mendes, M. Gómez-Florit, A. C. Araújo, J. Prada, P. Babo, R. M. A. Domingues, R. L. Reis, M. E. Gomes. Intrinsically bioactive cryogels based on platelet lysate nanocomposites for hemostasis applications. 2020. Biomacromolecules. (Accepted for publication).

B. B. Mendes, M. Gómez-Florit, H. Osório, A. Vilaça, R. M. A. Domingues, R. L. Reis, M. E. Gomes. Cellulose nanocrystals of variable sulfation degree can sequester specific platelet lysate-derived biomolecules to modulate stem cells response. 2020. Chemical Communications. DOI: 10.1039/D0CC01850C.

B. B. Mendes, M. Gómez-Florit, A. G. Hamilton, M. S. Detamore, R. M. A. Domingues, R. L. Reis, M. E. Gomes. Human platelet lysate-based nanocomposite bioink for bioprinting hierarchical fibrillar structures. 2019. Biofabrication. 12 (1), 015012.

S. Araújo-Custódio, M. Gómez-Florit, A. R. Tomás, **B. B. Mendes**, P. S. Babo, S. M. Mithieux, A S. Weiss, R. M. A. Domingues, R. L. Reis, M. E. Gomes. Injectable and magnetic responsive hydrogels with bioinspired ordered structures. 2019. ACS Biomaterials Science & Engineering. 5 (3), 1392-1404.

B. B. Mendes, M. Gómez-Florit, R. M. A. Domingues, R. L. Reis, M. E. Gomes. Human-based fibrillar nanocomposite hydrogel as bioinstructive matrices to tune stem cell behavior. 2018. Nanoscale. 10 (36), 17388-17401.

T. Pesqueira, R. Costa-Almeida, S. M. Mithieux, P. S. Babo, A. R. Franco, **B. B. Mendes**, R. M. A. Domingues, P. Freitas, R. L. Reis, M. E. Gomes and A. S. Weiss. Engineering magnetically responsive tropoelastin spongy-like hydrogels for soft tissue regeneration. 2018. Journal of Materials Chemistry B. 6 (7), 1066-1075.

B. B. Mendes, M. Gómez-Florit, P. S Babo, R.MA Domingues, R.L Reis, M. E Gomes. Blood derivatives awaken in regenerative medicine strategies to modulate wound healing. 2017. Advanced Drug Delivery Reviews. 129, 376-393.

E. Silva, P. S. Babo, R. Costa-Almeida, R. M. A. Domingues, **B. B. Mendes**, E. Paz, P. P. Freitas, M.T. Rodrigues, P. L. Granja and M. E. Gomes. Multifunctional magnetic-responsive hydrogels to engineer tendon-to-bone interface. 2017. Nanomedicine Nanotechnology Biology and Medicine. 14 (7), 2375-2385.

B. Mendes, C. Marques, I. Carvalho, P. Costa, S. Martins, D. Ferreira, B. Sarmento, Influence of glioma cells on a new co-culture in vitro blood brain barrier model for characterization and validation of permeability. 2015. International Journal of Pharmaceutics. 490 (1), 94-101.

OTHER PUBLICATIONS

B. B. Mendes, A. C. Daly, R. L. Reis, R. M. A. Domingues, M. E. Gomes, J. A. Burdick. Injectable hyaluronic acid and platelet lysate-derived granular hydrogels for biomedical applications. 2020. Acta Biomaterialia. (Current status: under review).

PATENT

B. B. Mendes, R. M. A. Domingues, P. Babo, R. L. Reis, M. E. Gomes. Blood derivatives composite material, methods of production and uses thereof. Patent application: WO 2018/078586 A1, EP 3532114 A1 and US 2019/0282621 A1. Priority date: 27 Oct 2016, PT.

BOOK CHAPTER

M. Gómez-Florit, R. M. A. Domingues, S. M. Bakht, **B. B. Mendes**, R. L. Reis, M. E. Gomes, Chapter 1.3.6. Natural Materials, in Biomaterials Science: An Introduction to Materials in Medicine, Fourth Edition, edited by William Wagner, Shelly Sakiyama-Elbert, Guigen Zhang and Michael Yaszemski, Elsevier, ISBN: 9780128161371, 2020.

M. João Gomes, **B. Mendes**, S. Martins, B. Sarmento, Nanoparticle functionalization for brain targeting drug delivery and diagnostic, in Handbook of Nanoparticles: Synthesis, Functionalization and Surface Treatment, edited by Mahmood Aliofkhazraei, Springer, ISBN 978-3-319-15337-7, 2015.

M. João Gomes, **B. Mendes**, S. Martins, B. Sarmento, Cell-based in vitro models for studying BBB permeability, in Concepts and models for drug permeability studies – Cell and tissue-based in vitro culture models, edited by Bruno Sarmento, Elsevier, ISBN: 978-0-08-100094-6, 2015.

COMMUNICATIONS

ABSTRACTS PUBLISHED ON INDEXED JOURNALS - ORAL COMMUNICATIONS

M. Gómez-Florit*, **B. B. Mendes***, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 12 to 14 June 2019. Platelet Lysate-Based Nanocomposite Biomaterials for Tissue Engineering & Regenerative Medicine. In eCM Online Periodical 2019, Collection 2: Scandinavian Society for Biomaterials 2019 Conference. Page 13. Kirkkonummi, Finland. (*contributed equally to this work).

B. B. Mendes, R. Costa-Almeida, P. S. Babo, R. M. A. Domingues, R. L. Reis and M. E. Gomes. 26 to 30 June 2017. Injectable platelet lysate/cellulose nanocrystals hydrogels: a novel combined approach for regenerative medicine strategies. In eCM Meeting Abstracts 2017, Collection 2: Personalized Therapies for Regenerative Medicine, TERMIS-EU 2017. 0105. Davos, Switzerland.

ORAL COMMUNICATIONS

B. B. Mendes, M. Gómez-Florit, A. C. Daly, R. M. A. Domingues, R. L. Reis, M. E. Gomes, J. A. Burdick. 16 to 19 October 2019. Platelet Lysate-Based Bioinks for 3D Printing Applications. BMES 2019 Annual Meeting Philadelphia, USA.

B. B. Mendes*, M. Gómez-Florit*, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 09 to 13 September 2018. Platelet lysate fibrillar nanocomposite bioink for soft tissues bioprinting. ESB 2018. 628. Maastritcht, Netherlands. (*contributed equally to this work).

M. Gómez-Florit*, **B. B. Mendes***, A. Hamilton, R. M. A. Domingues, M. S. Detamore, R. L. Reis, M. E. Gomes. 03 to 08 June 2018. Human-based nanocomposite bioink for freeform structures printing. CHEM2Nature – Summer School. Porto, Portugal. (*contributed equally to this work).

B. B. Mendes, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 5 to 9 June 2017. Incorporation of modified cellulose nanocrystals in platelet lysate-based hydrogels for 3D microenvironment sequestration of platelet lysate bioactive molecules. CHEM2Nature - Second School. Porto, Portugal.

B. B. Mendes, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 21 to 25 November 2016. Sulfated cellulose nanocrystals: synthesis and application on growth factors sequestering biomaterials. CHEM2Nature - First School. Guimarães, Portugal

RAPID FIRE COMMUNICATIONS

S. M. Bakht, T. Lamers, M. Gomez-Florit, M. Sixt, **B. B. Mendes**, R. L. Reis, R. M. A. Domingues and M. E. Gomes. 04 to 05 November 2019. Combining 3D Printing with Nanoparticles Self-Assembly for the Fabrication of Fibrillar, Perfusable and Transparent Microfluidics Devices. Second Achilles Conference. Braga, Portugal.

ABSTRACTS PUBLISHED ON INDEXED JOURNALS - POSTER COMMUNICATIONS

B. B. Mendes, M. Gómez-Florit, L. Randall, P. S. Babo, R. C. Almeida, Michael S. Detamore, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 3 to 6 April 2019. Human-based nanocomposite cryogels for hemostatic and wound healing applications. In Transactions of the Annual Meeting of the Society for Biomaterials and the Annual International Biomaterials Symposium: 42nd Society for Biomaterials Annual Meeting and Exposition 2019. P. 597. Seattle, United States of America.

E. Silva, P. S. Babo, R. Costa-Almeida, R. M. A. Domingues, **B. B. Mendes**, P. L. Granja and M. E. Gomes. 26 to 30 June 2017. Multifunctional magnetic-responsive hydrogels modulate platelet lysate-derived growth factor release and guide cell fate. In eCM Meeting Abstracts 2017, Collection 2: Personalized Therapies for Regenerative Medicine, TERMIS-EU 2017. P37. Davos, Switzerland.

C. Marques, A. R. Azevedo, I. Carvalho, **B. Mendes**, M. Ferreira, G. Ferreira, A. R. Moreira, P. Costa, B. Sarmento and D. Ferreira. 13 to 16 September 2015. Solid lipid nanoparticles as carriers for camptothecin delivery to brain tumor using an in vitro blood brain barrier model. Toxicity, permeability and inflammatory studies. In Toxicology Letters: 51st Congress of the European Societies of Toxicology (EUROTOX). 383 (2): S213. Porto, Portugal.

POSTER COMMUNICATIONS

S. M. Bakht, T. Lamers, T.; M. Gomez-Florit, M. Sixt, **B. B. Mendes**, R. L. Reis, R. M. A. Domingues, M. E. Gomes. 3D Printing/Bioprinting of Miniaturized Tissues Embedded in Self-Assembled Nanoparticle-based Fibrillar Platforms. TERMIS EU 2020, Online Conference.

B. B. Mendes, A. Vilaça, M. Gómez-Florit, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 07 to 08 November 2019. Cellulose nanocrystals of variable sulfation degree for sequestering specific growth factors. TERMSTEM 2019. Braga, Portugal.

S. M. Bakht, T. Lamers, M. Gomez-Florit, M. Sixt, **B. B. Mendes**, R. L. Reis, R. M. A. Domingues and M. E. Gomes. 25 to 27 September 2019. Combining 3D Printing with Nanoparticles Self-Assembly for the Fabrication of Fibrillar, Perfusable and Transparent Microfluidics Devices. 1st Discoveries Forum on regenerative and precision medicine. Porto, Portugal.

B. B. Mendes, M. Gómez-Florit, L. Randall, P. S. Babo, R. C. Almeida, Michael S. Detamore, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 9 to 13 September 2019. Intrinsically bioactive cryogels for hemorrhage hemostasis and regenerative wound healing applications. 30th Annual Meeting of the European Society for Biomaterials. Dresden, Germany.

B. B. Mendes, M. Gómez-Florit, L. Randall, P. S. Babo, R. C. Almeida, Michael S. Detamore, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 23 to 26 October 2018. Human-based hemostatic cryogels for wound healing applications. CHEM2Nature – Final Conference. Guimarães, Portugal.

R. M. A. Domingues, S. Araújo-Custódio, A. Tomás, **B. B. Mendes**, M. Gómez-Florit, P.S. Babo, R. L. Reis, M.E. Gomes. 09 to 13 September 2018. Injectable and Magnetic Responsive Hydrogels with Bioinspired Ordered Structures for the Regeneration of Anisotropic Tissues, 29th Annual

Meeting of the European Society for Biomaterials. P842. Maastricht, Netherlands.

M. Gómez-Florit*, **B. B. Mendes***, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 04 to 07 September 2018. Platelet Lysate-based Nanocomposite Bioink for 3D Printing in Tissue Engineering. 5TH World TERMIS congress 2018. 01-P066. Kyoto, Japan. (*contributed equally to this work)

R. M. A. Domingues, S. Araújo-Custódio, **B. B. Mendes**, M. Gómez-Florit, P. S. Babo, R. L. Reis, M. E. Gomes. 04 to 07 September 2018. Cellulose nanocrystals as nanostructuring tools to modulate the artificial cell microenvironment in nanocomposite hydrogels. 5TH World TERMIS congress 2018. 02-P447. Kyoto, Japan.

B. B. Mendes, R. M. A. Domingues, Rui L. Reis, M. E. Gomes. 02 to 04 July 2018. Human-based nanocomposite scaffolds towards new bioinstructive matrices to TERM strategies. Encontro de Ciência 2018. Lisboa, Portugal.

B. B. Mendes*, M. Gómez-Florit*, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 15 to 17 November 2017. Platelet lysate loaded in nanocomposite bioinks towards a new generation of bioinks for TERM strategy. Forecast 2017. Porto, Portugal. (*contributed equally to this work)

M. Gómez-Florit*, **B. B. Mendes***, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 4 to 8 September 2017. Tunable Nanocomposite Bioactive Bioinks for 3D Printing in Tissue Engineering. 28th Annual Conference of the European Society for Biomaterials 2017. PP494. Athens, Greece. (*contributed equally to this work)

S. M. Bakht, R. M. A. Domingues, **B. B. Mendes**, R. L. Reis, M. E. Gomes. 15 to 17 November 2017. Development of tunable supramolecular nanocomposite hydrogels as nanoinks for tissue specific needs in bioprinting. FORECAST 2017. Porto, Portugal.

M. Gómez-Florit, **B. B. Mendes**, R. M. A. Domingues, R. L. Reis, M. E. Gomes. 5 to 9 June 2017. Research road map towards the development of scaffolds for tendon tissue engineering. CHEM2Nature - Second School. Porto, Portugal.

E. Silva, P. S. Babo, R. Costa-Almeida, R. M. A. Domingues, **B. B. Mendes**, P. L. Granja and M. E. Gomes. 27 and 28 October 2016. Multifunctional magnetic-responsive hydrogels to engineer tendon-to-bone interface. TERM STEM 2016. Guimarães, Portugal.

B. B. Mendes, R. Costa-Almeida, P. S. Babo, R. M. A. Domingues, R. L. Reis and M. E. Gomes. 27 and 28 October 2016. Platelet lysate hydrogels enriched with oxidized cellulose nanocrystals. TERM STEM 2016. Guimarães, Portugal.

C. Marques, **B. Mendes**, A. R. Azevedo, P. Costa, S. Martins, B. Sarmento and D. Ferreira. 8 to 17 July 2014. Drug loaded-lipid nanoparticles as carriers for drug delivery to glioma using an in vitro blood brain barrier model. 11th International Conference on Nanosciences & Nanotechnologies. Thelassoniki, Greece.

B. Mendes, C. Marques, P. Costa, S. Martins, D. Ferreira and B. Sarmento. 2 to 4 July 2014. Development of an in vitro Blood-Brain Barrier model for drug-loaded solid lipid nanoparticles delivery. 5th International Conference on Advanced Nanomedicine. Aveiro, Portugal.

B. Mendes, C. Marques, P. Costa, S. Martins, D. Ferreira and B. Sarmento. 12 to 14 February 2014. Development and characterization of a co-culture two-dimensional blood-brain barrier for the study and correlation of drug permeation. 7th meeting of new investigators of Porto University. Porto, Portugal.

SUPERVISION EXPERIENCE

Supervision through their first contact with laboratory equipment and scientific method of work.

Milan Sixt, MSc student - Hochschule Bremen Germany, Germany (From 10th September 2018 to 09th February 2019). Optimization of Cellulose Nanocrystal hydrogel support baths for high resolution 3D Bioprinting.

Lindsey Randall, MSc student - Stephenson School of Biomedical Engineering, University of Oklahoma, Norman, USA (From 03rd June to 03rd August 2018). Characterization of platelet lysate sponges reinforced with oxidized cellulose nanocrystals.

Research trainee supervision:

Miguel Antunes, BSc student – Summer internship, Instituto Superior Técnico. (August 2016)

Marisa Monteiro, BSc student – Summer internship, Volunteer graduate trainee. (August 2016).

PROJECTS PARTICIPATION

InjecTE – Injectable biomaterials for dental tissue engineering. – Research Council of Norway. (Ref. 287953). Date: 2019 to 2025.

MagTendon – Magnetic tissue engineering approaches for tendon regeneration. CoG (Manuela E. Gomes), European Research Council. (Ref. 772817). Date: 2018 to 2023.

Nanoplant - Nanopatterned dental implants to enhance soft tissue integration and reduce bacterial colonization. ITI Foundation for Oral Implantology and its border areas. (Ref. 1306_2018). Date: 2018 to 29.02.2020.

Achilles – Overcoming specific weaknesses in tendon biology to design the advanced regenerative therapies. H2020-WIDESPREAD-05-2017-Twinning (Ref. 810850). Date: 2018 to 2021.

INVITROBRAIN - Development of a humanized dynamic in vitro blood-brain barrier model and a vesicle-based barrier for brain penetration of drugs incorporated in lipid nanoparticles - closing the gap between in vivo and in vitro properties. Fundação para a Ciência e Tecnologia. PTDC/SAU-FAR/112277/2009. Date: 2014 to 2015

SCIENCE OUTREACH

B. B. Mendes, "Orgãos à la Carte", PubhD Uminho, STOL - Science Through Our Lives. November 2016.

CONFERENCE ORGANIZING COMITEE

Second Achilles Conference "Tendon Biophysical Environment". 04 to 05 November 2019. Braga, Portugal.

CHEM2Nature – Final Conference. "Multifunctional Biomaterials Inspired by Nature". 25 to 26 October 2018. Guimarães, Portugal.

Forecast. 15 to 17 November 2017. Porto, Portugal.

CHEM2Nature – First School. 21 to 25 November 2016. Guimarães, Portugal.

RESEARCH HIGHLIGHTS

Research highlight "Cells thrive in blood-based bioink" by Physicsworld news journal: https://physicsworld.com/a/cells-thrive-in-blood-based-bioink/ (2019).

REVIEWING ACTIVITIES

International Journal of Pharmaceutics, Elsevier.

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

Biomedical Engineering Society – BMES

European Society for Biomaterials - ESB

Tissue Engineering and Regenerative Medicine International Society - TERMIS

CERTIFICATES

Formação Pedagógica Inicial de Formadores. IEFP. May 2015. (Ref. F621719/2015).

First English Certificate (FCE), Cambridge English Language Assessment. June 2014.

OTHER ACTIVITIES

Hotel General manager

Travel consultant

Primary education teaching associate

LANGUAGES

Portuguese: Native
English: Fluent
Spanish: Fluent

REFEREES

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