3.6.1 Bone Pathophysiology and Biomaterials

Publications:4 | **Q1:**2

COMPOSITION

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- **Laura Saldaña Quero.** Investigadora Senior (Contrato Miguel Servet-Tipo II). Jefe de Laboratorio. FIBHULP
- **Gema Vallés Pérez.** Investigadora Senior. Responsables de Cultivos Celulares y de los Laboratorios Comunes de IdiPAZ. FIBHULP

STRATEGIC OBJETIVES

- The Bone Physiopathology and Biomaterials group includes basic and clinical researchers from IdiPAZ. The group has broad experience in clinical and basic research on biomaterials for orthopaedic implants and bone tissue engineering. The main goal of the group is to improve the clinical outcome of orthopaedic surgery through research on implants and biomaterials used for manufacturing prosthetic devices.
- The group is interested in the study of mechanisms underlying joint diseases, in developing tissue engineering-based therapies as well as in evaluating biomaterials manufactured by collaborative partners. Specific areas of clinical research on implants include follow-up studies on various devices in use for osteoarticular surgery.
- The team is also involved in the manipulation of the heat shock response to generate transcriptional targeting strategies that provide tight control of the expression of therapeutic proteins. Their potential application in bone and wound healing therapies as well as in the generation of influenza vaccines with anti-herpetic activity are being explored. This strategic objective also includes the identification and characterization of the heat shock transcription factor 1 (HSF1) inhibitors as antitumoral agents.

RESEARCH LINES

- Clinical research in implants for bone repair
- Study of the pathophysiology of joint diseases and mechanisms involved in bone regeneration.
- Evaluation of new biomaterials, including scaffolds and nanoparticles, for their potential use in wound healing and bone tissue engineering application.
- Development of gene therapy switches to control the expression of transgenes to a) enhance bone regeneration and wound healing or b) generate influenza vaccines. Application of non-invasive near-infrared energy combined with photothermal nanoparticles.
- Identification and characterization of HSF1 inhibitors as antitumoral drugs.

RESEARCH ACTIVITY

Publications

- **Arnold JB, Halstead J, Martín-Hervás C, Grainger AJ, Keenan AM, Hill CL, Conaghan PG, McGonagle D, Redmond AC.** Bone marrow lesions and magnetic resonance imaging-detected structural abnormalities in patients with midfoot pain and osteoarthritis: a cross-sectional study. Arthrit Care Res. 2023; 75(5): 1113-22. Article. IF: 3.7; Q1
- **Escudero-Duch C, Muñoz-Moreno L, Martín-Saavedra F, Sánchez-Casanova S, Lerma-Juarez MA, Vilaboa N.** Remote control of transgene expression using noninvasive near-infrared irradiation. J Photoch Photobio B. 2023; 242: 112697. Article. IF: 3.9; Q2
- **Sánchez CB, Mateo NC, Saldaña L, Valdivieso A, Earl J, Gómez IG, Rodríguez-Lorenzo LM.** Selection and optimization of a bioink based on panc-1-plasma/alginate/methylcellulose for pancreatic tumour modelling. Polymers-Basel. 2023; 15(15): 3196. Article. IF: 4.7; Q1
- **Vilaboa N, López JA, de Mesa M, Escudero-Duch C, Winfield N, Bayford M, Voellmy R.** Disruption of proteostasis by natural products and synthetic compounds that induce pervasive unfolding of proteins: therapeutic implications. Pharmaceuticals (Basel). 2023; 16(4): 616. Article. IF: 4.3; Q2

Research projects

- **Beatriz García Brihuega.** Contrato garantía juvenil (PEJ-2021-TL/BMD-22184). CM. 2022-2024. *Managment centre: FIBHULP*
- **Escudero-Duch C.** Films de PLA con patrón microestructurado para promover la cicatrización de heridas. CIBER-BBN. 2023-2024. *Managment centre: CIBER-BBN*
- **Lerma Juarez MA.** Contrato predoctoral (PRE2019-090430). MICIU. 2020-2024. *Managment centre: FIBHULP*
- **Rodrigo Fernando Serrano Yamba.** Contrato garantía juvenil (PEJ-2020-AI/BMD-17656). CM. 2021-2023. *Managment centre: FIBHULP*
- **Saldaña Quero L.** Identificación de factores moleculares implicados en la osteonecrosis idiopática: análisis del transcriptoma del tejido óseo (PI18/00643). ISCIII. 2019-2023. *Managment centre: FIBHULP*
- **Saldaña Quero L.** Osteonecrosis de cabeza femoral: identificación de alteraciones en el hueso trabecular, correlación clínica y factores de riesgo en la fijación de la prótesis total de cadera (PI22/00939). ISCIII. 2023-2025. *Managment centre: FIBHULP*
- **Vilaboa Díaz NE, Saldaña Quero L.** Desarrollo de fluidos que potencien o favorezcan la osteointegración de los implantes ante distintas situaciones. Mozo-Grau S. A. 2017-Ongoing. *Managment centre: FIBHULP*
- **Vilaboa Díaz NE.** Contrato Miguel Servet Categoria A (CES07/031). CM. 2007-2025. *Managment centre: FIBHULP*
- **Vilaboa Díaz NE.** Detección de activación de HSF partes XV y XVI. HSF Pharmaceuticals S.A.. 2004-Ongoing. *Managment centre: FIBHULP*
- **Vilaboa Díaz NE.** Hidrogeles que responden a energía infrarroja y contienen adenovirus de alta capacidad. Aplicación en regeneración ósea (RTI2018-095159-B-I00). MICIU. 2019-2022. *Managment centre: FIBHULP*
- **Vilaboa Díaz NE.** Nuevas soluciones terapéuticas para el tratamiento de la piel radiada (RADIOPROTECT-CM) (P2022/BMD-7406). CM. 2023-2026. *Managment centre: FIBHULP*
- **Vilaboa Díaz NE.** Potencial traslacional de inhibidores del factor de transcripción HSF1 como drogas anticancerigenas (PID2021-126325OB-I00). Ministerio de Ciencia e Innovación. 2022-2024. *Managment centre: FIBHULP*

Cibers and Retics

- **Vilaboa Díaz NE.** Networked Biomedical Research Center for Bio-engineering, Biomaterials and Nanomedicine. (CIBER-bbn). Carlos III Health Institute. (31/12/2024). FIBHULP

Patents and trademarks

- **González Carrasco JL, Benavente Castro R, Cifuentes Cuellar SC, Lieblich Rodríguez M, Olalde Graells B, Atorrasagasti Goyalde G, Argarate Madariaga N, Pacha Olivenza MA, Fernández Calderón MC, Saldaña Quero L, González Martín ML, Pérez Giraldo C, Gallardo Moreno AM, inventors; CSIC, Fundación Tecnalia Research & Innovation, FIBHULP, Universidad de Extremadura, Centro de Investigación Biomédica en Red (CIBER).** Moldable, biodegradable, biocompatible and bioresorbable implant material, method for its preparation and uses thereof. P201530683; 2015 May 18.
- **Martín Saavedra FM, Vilaboa Díaz NE, Cebrián Hernando V, Arruebo Gordo M, Santamaría Ramiro J, Gómez Navascués L, inventors; FIBHULP, CIBER-BBN, Universidad de Zaragoza, assignees.** Fibrin hydrogel with plasmonic nanoparticles; P201330894, PCT/ES2014/070484; 2013 June 14.
- **Vilaboa Díaz NE, Calzado Martín A, Crespo García L, Saldaña Quero L, Moreo Calvo P, Alastrué Vera V, inventors; FIBHULP, CIBER-BBN, assignees.** Chamber device for dynamic cell culture on biomaterials; P201330040, PCT/ES2013/070819; 2013 January 16.
- **Vilaboa Díaz NE, Gónzalez Carrasco JL, Multigner Domínguez M, Lieblich Rodríguez M, Muñoz Hernández M, Frutos Torres E, Saldaña Quero L, inventors; FIBHULP, CSIC, CIBER-BBN, Universidad Alfonso X El Sabio, assignees.** Magnesium/polymer composite biomaterial for biomedical applications; P201030950, PCT/ES2011/070440; 2010 June 21.
- **Vilaboa Díaz NE, González Carrasco JL, Saldaña Quero L, Frutos Torres E.** inventors; FIBHULP, CSIC, CIBER-BBN, assignees. Method to obtain a metallic-coated biomaterial; P201030949, PCT/ES2011/070400; 2010 June 21.
- **Voellmy R, Vilaboa Díaz NE, inventors; HSF Pharmaceuticals S.**A., assignee. Inhibitors of heat shock factor I and uses thereof. US 16501272, 2023 March 7.