

CURRICULUM VITAE ABREVIADO (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

Part A. PERSONAL INFORMATION

First name	María Esther		
Family name	Reina Romo		
Gender (*)	Female	Birth date (dd/mm/yyyy)	
Social Security, Passport, ID number			
e-mail	erreina@us.es	https://institucional.us.es/mechbiolab/	
Open Researcher and Contributor ID (ORCID) (*)	0000-0002-5714-465X		

A.1. Current position

Position	Full professor		
Initial date	27/07/2021		
Institution	University of Seville		
Department/Center	Ingeniería Mecánica y de Fabricación	Escuela Técnica Superior de Ingeniería	
Country	Spain	Teleph. number	
Key words	Biomechanics, mechanobiology, bone, finite element		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
2006-2009	PhD Student granted by Spanish government (FPU)
2009-2012	Assistant professor
2012-2017	“Contratado doctor” professor
2017-2021	Associate professor

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Industrial Engineer (Mechanical)	University of Seville (US)	2005
PhD Industrial Engineer (Mechanical)	University of Seville (US)	2010

Part B. CV SUMMARY (max. 5000 characters, including spaces)

I have studied Mechanical Engineering (2000-2005) at the University of Seville (US) obtaining the third best academic record of the XXXIV promotion. After finishing my studies in 2005, I started my PhD under the supervision of Dr. Jaime Domínguez Abascal (US) and Dr. José Manuel García Aznar (University of Zaragoza). I finished my PhD in 2010, obtaining the extraordinary PhD award from the University and the award for the best doctoral thesis from the Seville City Council.

I have a track record of solving challenges at the interface between mechanics, biology and physics. For instance, I have simultaneously quantified computationally and experimentally the effects of mechanics on biological tissues across scales and time. These and other groundbreaking contributions have been collected in 40 JCR publications, have been recognized with multiple young investigator and research awards and have enabled me to be the youngest faculty in my department to rise to full professor rank in the past 20 years. To carry out these investigations, I have managed and coordinated, as PI of the mechanobiology Lab of the University of Seville, a multidisciplinary team (composed of mechanical, electrical and material engineers, physicians and veterinarians) involved in the *in silico* modeling (single scale/multiscale, theory-based/data-based), small and large animal experimentation (bone transport, bone lengthening, tissue engineering), *in vitro* modeling (traction force microscopy) and mechanical characterization of biological tissues (e.g. nanoindentation, Digital Image



Correlation, Confocal Microscopy, micro-TACs, Raman spectroscopy, rheology). My current research group comprises 3 PhD students, 1 postdoc, 1 associate professor, several master students and benefits from a large number of national and international collaborators. The interdisciplinarity character of my team is evidenced by the PhD supervision of physicians as well as mechanical engineers, granted patents in collaboration with physicians and management and coordination of large national bioengineering research projects (uninterruptedly since my PhD defense as PI, see C.3). I have also been finalist of the ERC Consolidator grant in the 2021 and 2023 calls (invited to step 2 interview).

Currently, I am full professor of Mechanical Engineering and a permanent panel member (out of 4) of the Spanish State Research Agency for coordination, Evaluation and Scientific and Technical Monitoring (Panel: Mechanical, Naval and Aerospace Engineering) since 2021. I have been visiting professor at the University College of London (2009), University of Colorado (2011), University of Liège (2018), University Sorbonne Paris Nord (2023) and University of Oxford this year (2024).

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications

I include here 10 highlighted publications as senior author, divided by the category of the study: *in silico*, *in vivo* and *in vitro*, plus 1 work currently under review. In bold type is shown my supervised PhD students.

Results derived from *in silico* studies

- **Blázquez-Carmona P**, Sanz-Herrera JA, Mora-Macías J, Morgaz J, Domínguez J, Reina-Romo E (2022) Time-dependent collagen fibered structure in the early distraction callus: imaging characterization and mathematical modeling. *Ann Biomed Eng.* 50: 1798-1809.
- Reina-Romo E, Mandal S, Amorim PA, Bloemen V, Ferraris E, Geris L (2021) Towards the experimentally-informed *in silico* nozzle design optimization for extrusion-based bioprinting of shear-thinning hydrogels. *Front Bioeng Biotechnol.* 9: 701778.
- **Blázquez-Carmona P**, Sanz-Herrera JA, Martínez-Vázquez FJ, Domínguez J, Reina-Romo E (2021). Structural optimization of 3D-printed patient-specific ceramic scaffolds for *in vivo* bone regeneration in load-bearing defects. *J Mech Behav Biomed Mater.* 121:104613
- **Mora-Macías J**, Giráldez-Sánchez MÁ, López M, Domínguez J, Reina-Romo E (2019) Comparison of methods for assigning the material properties of the distraction callus in computational models. *Int J Numer Method Biomed Eng.* 35: e3227.

Results derived from *in vivo* studies

- **Blázquez-Carmona P**, Mora-Macías J, Morgaz J, Granados MM, Domínguez J, Reina-Romo E (2023). Gait analysis: an effective tool to mechanically monitor the bone regeneration of critical-sized defects in tissue engineering applications. *Plos One.* 18: e0296510.
- **Blázquez-Carmona P**, Mora-Macías J, Martínez-Vázquez FJ, Morgaz J, Domínguez J, Reina-Romo E (2023) Mechanics Predicts Effective Critical-Size Bone Regeneration Using 3D-Printed Bioceramic Scaffolds. *Tissue Eng Regen Med.* 20: 893-904.
- **Blázquez-Carmona P**, Mora-Macías J, Morgaz J, Fernández-Sarmiento JA, Domínguez J, Reina-Romo E (2021) Mechanobiology of bone consolidation during distraction osteogenesis: bone lengthening versus bone transport. *Ann Biomed Eng.* 49: 1209-1221.
- **Blázquez-Carmona P**, Mora-Macías J, Sanz-Herrera JA, Morgaz J, Navarrete-Calvo R, Domínguez J, Reina-Romo E (2021) Mechanical Influence of Surrounding Soft Tissue on Bone Regeneration Processes: A Bone Lengthening Study. *Ann Biomed Eng.* 49: 642-652.

Results derived from *ex vivo* studies

- **Mora-Macías J**, García-Florencio P, Pajares A, Miranda P, Domínguez J, Reina-Romo E (2021) Elastic Modulus of Woven Bone: Correlation with Evolution of Porosity and X-ray Greyscale. *Ann Biomed Eng.* 49: 180-190.
- **López-Pliego EM**, Mora-Macías J, Giráldez-Sánchez MA, Domínguez J, Reina-Romo E (2018) Histological study of the docking site after bone transport. Temporal evolution in a sheep model. *Injury.* 49: 1987-1992.

Finally, I have recently developed and submitted a manuscript that combines *in vitro* cultures, imaging techniques and *in silico* methodologies that shows that cancer cells in a stable mesenchymal state calibrate their mechanical interactions with the substrate to keep their migration and invasiveness capacities unaltered: “P Blázquez-Carmona, R Ruiz-Mateos, J



Barrasa-Fano, A Shapeti, JE Martín-Alfonso, J Domínguez, H Van Oosterwyck, E Reina-Romo*, JA. Sanz-Herrera* (* joint senior authorship). Quantitative atlas of collagen hydrogels reveals steric hindrance-guided calibration of tractions of mesenchymal cancer cells. Submitted". This expertise is fundamental for the current proposal, especially for WP5.

C.2. Congress

> 50 conference publications with associated abstracts and/or full conference proceedings papers. In include representative invited conferences / keynote talks:

-Modeling multiscale systems in bone mechanobiology. *Mathematical Institute, University of Oxford*. March 2024.

-Multiscale mechanobiological analysis of bone regeneration. *Université Sorbonne Paris Nord*. 2023

- Multiscale Mechanobiological analysis of the newly regenerated bone. 18th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering. Paris. 2023

- Investigación transdisciplinar en Biología, Medicina e Ingeniería. Instituto de Biomedicina de Sevilla. 2021

- *In silico* and *in vivo* Modeling of bone regeneration. KU Leuven. 2018

- Biomechanics and Mechanobiology. Liège Université. 2018

- Biomecánica, experimentación y modelos mecanobiológicos. Universidad de Huelva. 2017

- Distracción osteogénica: lecciones mecánicas aprendidas del alargamiento óseo. Real Academia Sevillana de Ciencias. 2016.

C.3. Research projects as PI (~ €900k)

2021 – 2024 Role of mechanics on osteoporosis: a distraction osteogenesis ovariectomized sheep model (PID2020-113790RB-I00). *Funding agency*: Ministry of Economy and Competitiveness of Spain. 196.867 € and a PhD grant for 4 years.

2020 – 2022 Tissue Engineering for the Correction of Large Bone Defects: In Silico and In Vivo Modeling (US-1261691). *Funding agency*: Andalusian Government. 87.200 €.

2018 – 2021 Repair of large bone defects: bone transport versus patient specific 3D printed scaffolds (DPI2017-82501-P). *Funding agency*: Spanish Ministry of Economy and Competitiveness. 123.420 € and a PhD grant for 4 years.

2015 – 2018 Mechanical characterization of the woven bone of the distraction callus (DPI2014-58233-P). *Funding agency*: Spanish Ministry of Economy and Competitiveness. 169400 € and a PhD grant for 4 years.

2011 – 2013 Design, Construction and Validation of a Biomimetic Platform for the Evaluation and Optimization of Tissue Engineered Constructs for Articular Cartilage Repair (DPI2010-20399-C04-02). *Funding agency*: Spanish Ministry of Science and Innovation. 42350 €.

C.4. Contracts, technological or transfer merits

– Number of granted patents: 1 ("Blood flow control device in a blood vessel", US, 2017)

– Number of private Research & Development contracts with companies and hospitals:

1. Estudio mecánico de diferentes fijaciones para injerto tendinoso. Instituto médico Arriaza. Universidad de Sevilla. 2022. 6000 EUR. Principal Investigator.
2. Realización de ensayos de calificación y revisión de cálculos mecánicos. Abengoa S.A. (Universidad de Sevilla). 2019-2020. 72600 EUR. Research member.
3. Realización de ensayos de calificación sobre flexibles. Abengoa S.A. (Universidad de Sevilla). 2019-2020. 9650 EUR. Research member.
4. Asesoramiento técnico en estudios y ensayos de viento. Atlantica Yield. 2017-2019. 42439 EUR. Research member.
5. Asistencia Técnica en el diseño mecánico mediante elementos finitos usando Ansys Workbench. Dragados Offshore. 2016. 2700 EUR. Principal Investigator.
6. Planificación quirúrgica aplicada a la cirugía de aloinjertos óseos masivos, prótesis e implantes, mediante técnicas avanzadas de imagen, simulación de tejidos y realidad virtual. FISEVI. 2010-2011. 20 000 EUR. Research member.
7. Análisis del diseño mecánico, elaboración del diseño estructural, análisis dinámico y asesoramiento en la construcción y pruebas del sistema procesador de bioetanol. Hynergreen Technologies S.A. (Universidad de Sevilla). 2009-2016. 647 927 EUR. Research member.



8. Desarrollo de un test metodológico para verificar la conexión roscada vástago-válvula de un amortiguador. BWI Poland Technologies. 2010-2011. 29706 EUR. Research member.

C.5. Supervision of students

2011-current Supervised 3 PhD (Pablo Blázquez Carmona -2022-, Juan Mora Macías -2016-, Esperanza López Pliego -2016-), 10 BSc and 11 MSc students to completion (University of Seville). Currently supervising 3 PhD students and 1 postdoc.

C.6. Awards

2021, 2023 Finalist of ERC Consolidator grant 2021, 2023 (invited to the interview).
2022 Losada Villasante award in the Scientific Research Category.
2017 Juan C. Simo prize. Association of Numerical Methods in Engineering (SEMNI).
2015,16 X, XI Business Idea competition prize in the field of biomechanics. US
2015 Royal academy award for Young Researchers. Seville.
2010 Award from Seville City Hall for the best doctoral thesis in Seville.
2010 Best doctoral thesis award 2009/10 at University of Seville.
2005 Award for the third best academic record at US (degree Industrial Engineering).

C.7. Organisation of scientific meetings

2024 Theoretical and numerical developments in cellular mechanobiology. IUTAM. Seville 3-5/6 2024 (Spain).
2017 International conference of the 23th European Society of Biomechanics. Number of participants: 570, Seville. 2017 (Spain). Organizers: E. Reina-Romo, J. Martínez, JA Sanz-Herrera, J. Ojeda
2012 National conference of the European Society of Biomechanics. Number of participants: 100. University of Seville. 2012. Organizers: E. Reina-Romo, JA Sanz-Herrera, J. Martínez.
2011 Member of the organizing committee of 5th International Symposium on defect and Material Mechanics (ISDMM11). Number of participants: 80, Seville (Spain) 2011.

C.8. Elected academy memberships

2021 – current Permanent panel member (out of 4) of the Spanish State Research Agency for coordination, Evaluation and Scientific and Technical Monitoring. Panel: Mechanical, Naval and Aerospace Engineering (PIN-INA). Spanish Ministry of Science.
2022 Head of the Advisory Board of “Ramón y Cajal” program (grants for postdoctoral work contracts of the Spanish State Research Agency). Panel: PIN-INA.
2022 Head of selection committee for María Zambrano/Margarita Salas/requalification grants. University Carlos III (Madrid). Panel: Industrial, Aerospace and Biomedical Engineering.
2018 – current Member of the Faculty Committee “Doctorate Program in Mechanical and Industrial Organization Engineering”. University of Seville

C.9. Reviewing activities

2023 Member of the Research Career award Committee of the European Society of Biomechanics.
2021 Invited expert and evaluator of Postdoctoral grants. University Carlos III.
2020 – current Member of the Reviewer Board of *Applied Sciences*.
2020 Member of the scientific Advisory Board of “Ramón y Cajal” program (PIN-INA)
2019 – 2021 Member selection board for the best PhD thesis prize (SEMNI).
2018 Member of the Scientific Advisory Board of R&D projects. AEI.
2017 – current Member of selection committee for academic positions in the University of Seville, the University of Granada and the University of Valencia.
2012 External scientific evaluator of research projects. Portuguese Science, Technology Foundation.
2011 – current Member of examination committees for PhD degrees in the U. Seville, U. Zaragoza, U. Extremadura, U. Liege (Belgium).
2010 – 2021 Invited expert and evaluator of R&D projects (> 40 projects). AEI.
2010 – current Ad-hoc reviewer > 20 journals (e.g. Nature Communications, CMAME).