

## Curriculum Vitae

### Miguel Torres, Ph.D.

**Date and place of birth:** October 18, 1963 - Madrid, Spain.

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#### CURRENT POSITION

**2007-present** Senior Scientist, Centro Nacional de Investigaciones Cardiovasculares (CNIC)

**2022-present** Coordinator of the CNIC Cardiovascular Regeneration Program

#### EDUCATION

M. Sc., Biology, Complutense University Madrid (UCM), 1986

Ph.D., Biochemistry and Molecular Biology, Autónoma University Madrid (UAM), 1991

#### PREVIOUS POSITIONS

2009 – 2012 Associate Director, Centro Nacional de Investigaciones Cardiovasculares, ISCIII. Madrid  
 2007 – 2015 Director, Department of Cardiovascular Development and Repair, CNIC, Madrid  
 2005 – 2006 Director, Immunology and Oncology Dept. Centro Nacional de Biotecnología, CSIC. Madrid  
 1999 – 2006 Tenured Group Leader. Centro Nacional de Biotecnología, CSIC. Madrid  
 1996 – 1999 Group Leader, Centro Nacional de Biotecnología, CSIC. Madrid  
 1992 – 1995 Postdoctoral Researcher, Max Planck Society, Goettingen, Germany  
 1991 – 1992 Postdoctoral Researcher, Centro de Investigaciones Biológicas, CSIC. Madrid  
 1988 – 1991 Predoctoral Researcher, Centro de Investigaciones Biológicas, CSIC. Madrid  
 1984 – 1987 Undergraduate student, Centro de Investigaciones Biológicas, CSIC, Madrid

#### SELECTED HONORS AND AWARDS

1988 Predoctoral Fellowship from the Spanish Ministry of Education and Science, Spain  
 1992 Postdoctoral Fellowship, European Molecular Biology Organization  
 1993 Postdoctoral Fellowship, European Union  
 1996-present Member of the Spanish Society for Developmental Biology  
 2001-2004 Member “Faculty of 1000”  
 2003- present Member of the Editorial Board of *Developmental Dynamics*  
 2004-2008 Member of the Scientific Advisory Board of the Biotech Oncostem Therapeutics  
 2009 Chair of the COST Action “HOX/ TALE transcription factors in Development and Disease”  
 2011- present Member of the Editorial Board of *Developmental Biology*  
 2011 Scientific Committee of the 2014 Weinstein Meeting on Cardiovascular Development  
 2011 Scientific co-director of the CNIC application that obtained the Severo Ochoa Award  
 2012 Shortlisted for the “La Vanguardia” price “Scientific breakthrough of the year”  
 2012- present Member of the Editorial Board of the *International Journal of Developmental Biology*  
 2013- 2017 Member of the New York Academy of Sciences  
 2014 Pfizer Price for the best basic science publication in Spain  
 2015 Member of the American Society for Developmental Biology  
 2015 -2017 Coordinator of the Fundamental and Systems Biology area for the Spanish Research Agency for Scientific Evaluation (ANEP)  
 2016- 2020 President of the Spanish Society for Developmental Biology  
 2016- present Member of the National Stem Cell Bank Technical Committee  
 2018, 20, 22 Member of ERC LS4 Consolidator grant evaluation panels  
 2019- present Member of the European Molecular Biology Organisation (EMBO)  
 2020- present Member of the Academia de Ciencias de America Latina (ACAL)

2021- present Associate Editor of *Science Advances*  
 2022, 23, 24 Member of the selection committee for the EMBO Installation Grants call  
 2024 ERC Advanced Grant

## BIOSKETCH

My research career has focused on understanding the regulation of embryonic development, organogenesis and regeneration. My fundamental contributions have dealt with the understanding of how gene activity regulates the processes of regionalization and tissue / regeneration homeostasis. During my PhD (CIB-CSIC) I was trained in the *Drosophila* model, and during the postdoctoral period (MPI- Germany) I majored in vertebrate development and the use of mouse genetics methodology. In 1996 I started my independent group, studying processes of pattern formation of the vertebrate limb and heart. Our contributions have been modified concepts rooted in the field of developmental biology for decades (Nature 1998 and 1999; Development 2000, 2014; Science 2011; Science Advances 2020; Nat Comm 2021) and are relevant for understanding process of organ regeneration (Development 2005). A large part of our work on organogenesis has been based on the study of genes encoding homeodomain transcription factors, area in which we have contributed to understanding their tissue patterning roles and the molecular basis underlying these functions (Dev Biol.2005; Circ. Res 2010; Cell Reports 2013). In the tissue homeostasis field, we have contributed to understanding the conservation of cell death pathways in metazoans (EMBO J 1998; 2002), we have provided the first evidence of endogenous cell competition in vertebrates (Nature 2013), identifying pluripotency protection in embryonic stem cell pools as one of its roles (Dev Cell 2017) and we have explored the roles of cell competition in heart development and homeostasis (Cell Reports 2014; Scientific Reports 2016; Development 2019). Recently, we were granted an ERC Adv grant on this topic (2024). We have also established and exploited new genetic approaches allowing clonal analysis, which has allowed us to describe new relationships and restrictions on vertebrate lineages (Development 2007, Blood 2014, Bone 2018, Dev Cell 2020; Development 2023). In the last decade, our work has expanded to the understanding of how cell behavior determines morphogenesis processes and tissue homeostasis, which led us to the implementation of new techniques, including new genetic tools and new methodologies for in vivo time-lapse 3D video microscopy. In this area, we have established the first comprehensive live microscopy methodology applicable to heart development in the mouse, which has allowed us to formulate a new model for linear heart tube formation (Elife 2017; Nature Cardiovascular Research 2022). In the last 15 years my research activity has combined with scientific management, first in CNB, where I assumed the leadership of the Department of Immunology and Oncology (2005-6) and then in the CNIC, as founding director of the Department of Cardiovascular Development and Repair in 2007. As Director of Department, I have been responsible for the recruitment and design of the scientific strategy. In addition, I assumed in 2009 the position of Associate Director of the Centre, acting until 2012 as the on-site scientific head of the institution, contributing to the recruitment of scientists, design of infrastructures and scientific strategy. Together with Dr. Valentin Fuster, General Director of CNIC, I was the co-IP of the project awarded with the CNIC Severo Ochoa in the first call of this program (2011). Currently, I coordinate the Cardiovascular Regeneration Program at CNIC.

## PUBLICATIONS

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Web of Science ResearcherID A-7388-2013

Google scholar: Total citations 12723, H-index: 55

### *Peer Reviewed Publications*

- 1 **M. Torres** and L. Sánchez (1989). The scute (T4) gene acts as a numerator element of the X:A signal that determines the state of activity of Sex-lethal in *Drosophila*. *EMBO J.* 8, 3079-3086.

- 2 B. Granadino, **M. Torres**, D. Bachiller, E. Torroja, J.L. Barbero and L. Sánchez (1991). Genetic and molecular analysis of new female specific lethal mutations at the gene Sxl of *Drosophila melanogaster*. *Genetics* 129, 371-383.
- 3 **M. Torres** and L. Sánchez (1991). The sisterless-b function of the *Drosophila* gene scute is restricted to the stage when the X:A ratio determines the activity of Sex-lethal. *Development* 113, 715-722.
- 4 **M. Torres** and L. Sánchez (1992). The *Drosophila* segmentation gene runt is needed for sex determination. *Genetical Research* 59, 189-198.
- 5 L. Sánchez, B. Granadino and **M. Torres** (1994). Sex determination in *Drosophila melanogaster* : X-linked genes involved in the initial step of Sex-lethal activation. *Developmental Genetics* 15, 251-264.
- 6 J. Del Mazo, G. Prantero, **M. Torres** and M. Ferraro (1994). DNA methylation changes during Mouse spermatogenesis. *Chromosome Research* 2, 147-152.
- 7 G. Yamada, A. Mansouri, **M. Torres**, M. Blum, E.T. Stuart, M. Schultz, E. de Robertis and P. Gruss. (1995). Targeted mutation of the mouse Goosecoid gene leads to neonatal death and craniofacial defects in mice. *Development* 121, 2917-2922.
- 8 **M. Torres**, E. Gómez-Pardo, G.R. Dressler and P. Gruss (1995). Pax-2 controls multiple steps of urogenital development. *Development* 121, 4057-4065.
- 9 A. Mansouri, Stoykova, **M. Torres** and P. Gruss (1996). Dysgenesis of Cephalic neural crest derivatives in Pax-7 <sup>-/-</sup> mutant mice. *Development* 122, 831-838.
- 10 **M. Torres**, E. Gómez-Pardo and Peter Gruss (1996). Pax-2 Contributes to inner ear patterning and optic nerve trajectory. *Development* 122, 3381-3391.
- 11 **M. Torres**, A. Stoykova, Huber, O., Chowdhury, K., Bonaldo, P., Mansoury, A., Butz, S., Kemler, R. and P. Gruss (1997). An alpha-E-Catenin gene trap mutation defines its function in preimplantation development. *Proc. Natl. Acad. Sci.*, 94, 901-906.
- 12 B. Sosa-Pineda, K. Chowdhury, **M. Torres**, G. Oliver and P. Gruss (1997). Pax-4 mutant mice show defects in Pancreatic development leading to Insulin deficiency. *Nature*, 386, 399-402.
- 13 K. Chowdhury, P. Bonaldo, **M. Torres**, A. Stoykova and P. and P. Gruss (1997). Evidence for stochastic integration of gene trap vectors into the mouse germline. *Nucleic Acids Research*, 25, 1531-1536.
- 14 A Bosse, Zülch, M.B. Becker, **M. Torres**, J.L. Gómez-Skarmeta, J. Modolell and P. Gruss (1997). Identification of the mammalian Iroquois homeobox gene family with overlapping expression during development of the early nervous system. *Mechanisms of Development*, 69, 169-181
- 15 **M. Torres** (1998) The use of Embryonic Stem Cells for the Genetic Manipulation of the Mouse. *Current Topics in Developmental Biology*, 36, 99-114.
- 16 **M. Torres** and F. Giráldez (1998). The development of the vertebrate inner ear. *Mechanisms of Development*, 71, 5-21
- 17 A. Stoykova\*, Chowdhury\* K., Bonaldo\*P., **Torres M.\*** and Gruss, P. (1998). Gene trap expression and mutational analysis for genes involved in the development of the mammalian nervous system. \*These authors contributed equally to this work. *Developmental Dynamics*, 212, 198-213

- 18 S. González-Crespo, M. Abu-Shaar, **M. Torres**, C. Martínez-A, R.S. Mann and G. Morata (1998). Antagonistic interactions between exd function and Hh (Dpp/Wg) signaling in the developing limb. *Nature*, 394, 198-200
- 19 P. Bonaldo\*, Chowdhury\*, K., Stoykova\*, A., **M. Torres\*** and Gruss, P. (1998). Efficient gene trap screening for novel developmental genes using IRES βgeo vector and in vitro preselection. *\*These authors contributed equally to this work. Experimental Cell Research*, 244, 125-136.
- 20 C. Clavería, J.P. Albar, A. Serrano J.M. Buesa, J.L. Barbero, C. Martínez-A and **M. Torres** (1998). Drosophila grim induces apoptosis in mammalian cells. *EMBO J.*, 17, 7199-7208.
- 21 N. Mercader, E. Leonardo, N. Azpiazu, A. Serrano, G. Morata, C. Martínez-A and **M. Torres** (1999). Conserved regulation of proximodistal limb axis development by Meis1/Hth. *Nature*, 402, 425-429.
- 22 P. Lauzurica, D. Sancho, **M. Torres**, B. Albella, M. Marazuela, T. Merino, J. A. Bueren, C. Martínez-A and F. Sánchez-Madrid. (2000). Phenotypic and functional characterization of hematopoietic cell lineages in CD69- deficient mice. *Blood*, 95, 2312-2320.
- 23 C. González-Buillault, E. Demandt, F. Wandosell, **M. Torres**, P. Bonaldo, A. Stoykova, K. Chowdhury, P. Gruss, J. Avila, and M.P. Sánchez (2000). Perinatal lethality of microtubule-associated protein 1B deficient mice expressing alternative isoforms of the proteins at low levels. *Mol. Cell. Neuroscience*, 16, 408-421.
- 24 N. Mercader, E. Leonardo, M. E. Piedra, C. Martínez-A, M. Á. Ros and **M. Torres** (2000). Opposing RA and FGF signals control proximodistal vertebrate limb development through regulation of Meis genes. *Development*, 127, 3961-3970.
- 25 R. Varona, R. Villares, L. Carramolino, I. Goya, A. Zaballos, J. Gutiérrez, **M. Torres**, C. Martínez-A and G. Marquez (2001). Mice deficient in CCR6 have impaired leukocyte homeostasis and altered contact hypersensitivity and delayed type hypersensitivity responses. *Journal of Clinical Investigation*, 107, R37-R45.
- 26 A. Pires-da Silva, K. Nayernia, W. Engel, **M. Torres**, A. Stoykova, K. Chowdhury, P. Gruss (2001). Mice Deficient for Spermatid Perinuclear RNA-Binding Protein Show Neurologic, Spermatogenic, and Sperm Morphological Abnormalities. *Dev. Biol.*, 233, 319-328.
- 27 F. Trousse, E. Martí, P. Gruss, **M. Torres** and P. Bovolenta (2001). Control of retinal ganglion cell axon growth: A new role for SHH. *Development*, 128, 3927-3936.
- 28 C. Clavería, E. Caminero, C. Martínez-A, S. Campuzano and **M. Torres** (2002). GH3, a novel proapoptotic domain in Drosophila Grim, promotes a mitochondrial death pathway. *EMBO J.* 21, 3327-3336.
- 29 **M. Torres**, J.P. Couso and M. Ros (2002). Building Limb Buds. *EMBO Reports*, 10, 933-937.
- 30 R Goya. Villares, J. Gutiérrez, A. Zaballos, L. Kremer, R. Varona, L. Carramolino, A. Serrano, P. Pallarés, L.M. Criado, **M. Torres**, C. Martínez-A and Gabriel Márquez (2003). Absence of CCR8 induces an altered mouse thymic architecture and enhanced contact hypersensitivity response, but CCR8-deficient mice show a normal response to an ovalbumin-induced allergic airway disease. *J Immunol* 170: 2138-2146.
- 31 Y. Takahashi, Nick Carpino, James C. Cross, **M. Torres**, Evan Parganas and James N. Ihle (2003). SOCS3: an essential regulator of LIF receptor signaling in trophoblast giant cell differentiation. *EMBO J.*, 22, 372-384.

- 32 C. Clavería and **M. Torres** (2003). Mitochondrial Apoptotic Pathways Induced by Drosophila Programmed Cell Death Regulators. *BBRC*, 304, 531-537.
- 33 C. Clavería, C. Martínez-A and **M. Torres** (2004). A Bax/Bak-independent mitochondrial death pathway triggered by Drosophila Grim GH3 domain in mammalian cells. *JBC*, 279, 1368-1375
- 34 V. Azcoitia, M. Aracil, C. Martínez-A and **M. Torres** (2005) The homeodomain protein Meis1 is essential for definitive hematopoiesis and vascular patterning in the mouse embryo. *Dev. Biol.* 280, 307-320.
- 35 N. Mercader, E. M. Tanaka and **M. Torres** (2005) Proximodistal identity during vertebrate limb regeneration is regulated by Meis homeodomain proteins. *Development*, 132:4131-42.
- 36 C. G. Arques, R. Doohan, J. Sharpe and **M. Torres** (2007) Mouse limb mesenchyme is compartmentalized along the dorso-ventral but not the proximo-distal or anterior-posterior axes. *Development* 134:3713-22.
- 37 S.F. Burn, Boot MJ, de Angelis C, Doohan R, Arques CG, **Torres M** and Hill RE. (2008) The Dynamics of Spleen Morphogenesis. *Dev. Biol.*, 318:303-11.
- 38 M.J. Boot, C Henrik Westerberg, JJ Sanz-Ezquerro, J. Coterell, R Schweitzer, **M Torres** and J Sharpe (2008) In vitro whole-organ imaging: Quantitative 4D analysis of growth and dynamic gene expression in mouse limb buds. *Nature Methods*, 5, 609-612
- 39 F. Sanchez-Madrid, MA del Pozo, A Bernad, **M Torres**, V Fuster (2008). CNIC: A new approach to cardiovascular research. *Nature Clinical Practice Cardiovascular Medicine* 5 CNIC Edition 2-6
- 40 N. Mercader, Selleri L, Criado LM, Pallares P, Parras C, Cleary ML and **Torres M.** (2009) Ectopic Meis1 expression in the mouse limb bud alters P-D patterning in a Pbx1-independent manner. *Int J Dev Biol*, 53:1483-94.
- 41 C.G. Arques and **M Torres** (2009). From lineage to shape: modeling dorsal-ventral specification in the developing mouse limb. *Contemporary Mathematics* 492, 13-25
- 42 L. Carramolino, Fuentes J, García-Andrés C, Azcoitia V, Riethmacher D, and **Torres M.** (2010). Platelets play an essential role in separating the blood and lymphatic vasculatures during embryonic angiogenesis. *Circulation Research* 106, 1197-201
- 43 C.A. Rossello, **Torres M.** (2010). Gene transfer by electroporation into hemogenic endothelium in the avian embryo. *Developmental Dynamics* 239:1748-54.
- 44 E. Jimenez-Guri, Udina F, Colas JF, Sharpe J, Padrón-Barthe L, **Torres M**, Pujades C. (2010). Clonal análisis in mice underlines the importance of rhombomeric boundaries in cell movement restriction Turing hindbrain segmentation. *PLoS One*. 5(4):e10112.
- 45 C. García-Andrés, **Torres M** (2010). Comparative expression pattern analysis of the highly conserved chemokines SDF1 and CXCL14 during amniote embryonic development. *Developmental Dynamics* 239:2769-77.
- 46 J.M. González-Rosa, Padrón-Barthe L, **Torres M**, Mercader N. (2010). Lineage tracing of epicardial cells during development and regeneration. *Rev Esp Cardiol* 63:36-48
- 47 A.C. Grimes, Durán AC, Sans-Coma V, Hami D, Santoro MM, **Torres M** (2010). Phylogeny informs ontogeny: a proposed common theme in the arterial pole of the vertebrate heart. *Evol Dev* 12:555-67

- 48 J.M. González-Rosa, Martín V, Peralta M, **Torres M**, Mercader N. (2011). Extensive scar formation and regression during heart regeneration after cryoinjury in zebrafish. *Development* 138:1663-74.
- 49 J. Casanova, Uribe V, Badia-Careaga C, Giovinazzo G, **Torres M**, Sanz-Ezquerro JJ. (2011) Apical ectodermal ridge morphogenesis in limb development is controlled by Arid3b-mediated regulation of cell movements. *Development* 138:1195-205.
- 50 Casas-Tinto S, **Torres M**, Moreno E (2011). The flower code and cancer development. *Clin Transl Oncol* 13:5-9.
- 51 L. Marcon, C García-Arqués, **M Torres** and J Sharpe. (2011). Computational clonal analysis of the developing mouse limb bud. *PLoS Computational Biology*, 7(2): e1001071.
- 52 A. Roselló-Díez, **Torres M**. (2011). Regulative patterning in limb bud transplants is induced by distalizing activity of apical ectodermal ridge signals on host limb cells. *Dev Dyn*. 240:1203-11.
- 53 A. Roselló-Díez, Ros MA, **Torres M**. (2011) Diffusible signals, not autonomous mechanisms, determine the main proximodistal limb subdivision. *Science* 332:1086-8.
- 54 Kovacic JC, Mercader N, **Torres M**, Boehm M, Fuster V (2012). Epithelial- and Endothelial- to Mesenchymal Transition: from Cardiovascular Development to Disease. *Circulation* 125:1795-1808
- 55 Martin-Puig S, Fuster V, **Torres M**. (2012) Heart repair: From natural mechanisms of Cardiomyocyte production to the design of new cardiac therapies. *Annals New York Acad. Sci.* 1254:71 - 81.
- 56 Fuster V, **Torres M**. (2012) CNIC: Achieving Research Excellence Through Collaboration. *Rev. Esp. Cardiol.* 65:511-516.
- 57 Hidalgo I, Herrera Merchan A, Ligos JM, Carramolino L, Nuñez J, Martínez F, Domínguez O, **Torres M**, González S. (2012) Ezh1 Is Required for Hematopoietic Stem Cell Maintenance and Prevents Senescence-like Cell Cycle Arrest. *Cell Stem Cell*. 11:649 - 662.
- 58 Richard C, Drevon C, Canto PY, Villain G, Bollérot K, Teillet MA, Vincent C, Roselló Castillo C, **Torres M**, Oberlin E, Souyri M, and Jaffredo T. (2013) Endothelio-mesenchymal interaction controls runx1 expression and modulates the notch pathway to initiate aortic haematopoiesis. *Developmental Cell* 24, 600-611
- 59 Penkov D, San Martín DM, Fernández-Díaz LC, Roselló CA, Torroja C, Sánchez-Cabo F, Warnatz HJ, Sultan M, Yaspo ML, Gabrieli A, Tkachuk V, Brendolan A, Blasi F\*, **Torres M\***. (2013) Analysis of the DNA-Binding Profile and Function of TALE Homeoproteins Reveals Their Specialization and Specific Interactions with Hox Genes/Proteins. *Cell Reports* 3, 1321-33. \*Corresponding authors
- 60 Johnen H, González-Silva L, Carramolino L, Flores JM, **Torres M**, Salvador JM. (2013) Gadd45g is essential for primary sex determination, male fertility and testis development. *PLoS One*. 8:e58751. doi:10.1371/journal.pone.0058751
- 61 Clavería C, Giovinazzo G, Sierra R, **Torres M** (2013). Myc-driven endogenous cell competition in the early mammalian embryo. *Nature*. 500, 39-44
- 62 Roselló-Díez, A., Arques, C.G., Delgado, I., Giovinazzo, G., **Torres, M.** (2014) Diffusible signals and epigenetic timing cooperate in late proximo-distal limb patterning. *Development*, 141, 1534-1543
- 63 Wellik, D.M., **Torres, M.**, Ros, M.A. (2014) Forward to the special issue on Hox/Tale transcription factors in development and disease. *Developmental Dynamics*, 243, 1-3

- 64 Longobardi, E., Penkov, D., Mateos, D., De Florian, G., **Torres, M.**, Blasi, F. (2014) Biochemistry of the Tale transcription factors PREP, MEIS, and PBX in vertebrates. *Developmental Dynamics*, 243, 59-75
- 65 Spieler, D., Kaffe, M., Knauf, F., Bessa, J., Tena, J.J., Giesert, F., Schormair, B., Tilch, E., Lee, H., Horsch, M., Czamara, D., Karbalai, N., Toerne, C.V., Waldenberger, M., Gieger, C., Lichtner, P., Claussnitzer, M., Naumann, R., Müller-Myhsok, B., **Torres, M.**, Garrett, L., Rozman, J., Klingenspor, M., Gailus-Durner, V., Fuchs, H., De Angelis, M.H., Beckers, J., Hölter, S.M., Meitinger, T., Hauck, S.M., Laumen, H., Wurst, W., Casares, F., Gómez-Skarmeta, J.L., Winkelmann, J. (2014) Restless Legs Syndrome-Associated intronic common variant in Meis1 alters enhancer function in the developing telencephalon *Genome Research*, 24, 592-603
- 66 Villa del Campo, C., Clavería, C., Rocío, Sierra, R. and **Torres, M.** (2014). Cell competition promotes phenotypically silent cardiomyocyte replacement in the mammalian heart. *Cell Reports*, 8, 1741-1751
- 67 Padrón-Barthe, L., Temiño, S, Villa del Campo, C., Carramolino, L., Isern, J., and **Torres, M.** (2014) Clonal analysis identifies hemogenic endothelium as the source of the blood–endothelial common lineage in the mouse embryo. *Blood*, 124, 2523-2532
- 68 González-Lázaro, M., Roselló-Díez, A., Delgado, I, Carramolino, L., Sanguino, M.A., Giovinazzo, G. and **Torres, M.** (2015) Two New Targeted Alleles for the Comprehensive Analysis of Meis1 Functions in the Mouse. *Genesis*, 12, 967-75
- 69 Cruz, FM, Sanz-Rosa, D, Roche-Molina, M, García- Prieto, J, García-Ruiz, JM, Pizarro, G, Jiménez-Borreguero, LJ, **Torres, M**, Bernad, A, Ruíz-Cabello, J, Fuster, V, Ibáñez, B, Bernal, JA. (2015) Exercise triggers arrhythmogenic right ventricular cardiomyopathy phenotype in mice expressing a disease-causing mutated version of human plakophilin-2 after single adeno-associated virus-mediated gene transfer. *JACC* 65,1438-1450
- 70 Marcos, S., González-Lázaro, M., Beccari, L., Carramolino, L., Martin-Bermejo, MJ, Amarie, O, Mateos-San Martín, D, Torroja, C., Bogdanović, O, Doohan, R., Puk, O., Hrabě de Angelis, M., Graw, J., Gomez-Skarmeta, JL, Casares, F, **Torres, M\***, Bovolenta, P\*. (2015). *Meis1* coordinates a network of genes implicated in eye development and microphthalmia. *Development*, doi:10.1242/dev.122176.  
\*Corresponding
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- 72 Rataj-Baniowska M, Niewiadomska-Cimicka A, Paschaki M, Szyszka-Niagolov M, Carramolino L, **Torres M**, Dollé P, Krężel W. (2015) Retinoic Acid Receptor  $\beta$  Controls Development of Striatonigral Projection Neurons through FGF-Dependent and Meis1-Dependent Mechanisms. *J Neuroscience* 35:14467-75. doi:10.1523/JNEUROSCI.1278-15.2015
- 73 Fernández, LC, **Torres M\***, Real, FX\* (2016) *Nature Reviews Cancer* 16, 43–55. doi:10.1038/nrc.2015.1 \* Corresponding
- 74 Villa Del Campo C, Lioux G, Carmona R, Sierra R, Muñoz-Chápuli R, Clavería C, **Torres M** (2016) Myc overexpression enhances epicardial contribution to the developing heart and promotes extensive expansion of the cardiomyocyte population. *Sci Rep*. 6:35366. doi: 10.1038/srep35366.
- 75 Clavería C, **Torres M** (2016) Cell Competition: Mechanisms and Physiological Roles. *Annu Rev Cell Dev Biol*. 32:411-439.
- 76 **Torres M** (2016) Regeneration: Limb regrowth takes two. *Nature* 533(7603):328-30 doi:10.1038/nature17889.

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- 78 Fernández-de-Manuel L, Díaz-Díaz C, Jiménez-Carretero D, **Torres M**, Montoya MC. ESC-Track: A computer workflow for 4-D segmentation, tracking, lineage tracing and dynamic context analysis of ESCs. *Biotechniques*. (2017) 62:215-222. doi: 10.2144/000114545.
- 79 Salminen AV, Schormair B, Flachskamm C, **Torres M**, Kimura M, Winkelmann J (2017) Sleep disturbance by pramipexole is modified by Meis1 in mice. *Journal of Sleep Research* doi: 10.1111/jsr.12557
- 80 Salminen AV, Garrett L, Schormair B, Rozman J, Giesert F, Niedermeier KM, Becker L, Rathkolb B, Racz I, German Mouse Clinic Consortium, Klingenspor M, Klopstock T, Wolf E, Zimmer A, Gailus-Durner V, **Torres M**, Fuchs H, Hrabe de Angelis M, Wurst W, Holter SM, and Winkelmann J (2017) Meis1 effects on motor phenotypes and the sensorimotor system in mice. Meis1 effects on motor phenotypes and the sensorimotor system in mice. *Disease Models and Mechanisms*, 10:981-991
- 81 Delgado I, **Torres M** (2017) Coordination of limb development by crosstalk among axial patterning pathways. *Developmental Biology* 1606: 30739-4. doi: 10.1016/j.ydbio.2017.03.006.
- 82 Díaz-Díaz C Fernández-de-Manuel L, Jiménez-Carretero D, Montoya MC, Clavería C, **Torres M** (2017). Pluripotency surveillance by Myc-driven competitive elimination of differentiating cells. *Developmental Cell*, 42: 585–599
- 83 Le Garrec JF, Domínguez JN, Desgrange A, Ivanovitch K, Raphaël E, Bangham JA, **Torres M**, Enrico Coen, Mohun TJ and Meilhac, SM. (2017) A predictive model of asymmetric morphogenesis from 3D reconstructions of mouse heart looping dynamics. *Elife*, 6:e28951. doi: 10.7554/eLife.28951
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- 87 Muñoz-Martín N, Sierra R, Schimmang T, Villa Del Campo C, **Torres M**. (2019) Myc is dispensable for cardiomyocyte development but rescues Mycn-deficient hearts through functional replacement and cell competition. *Development*. dev.170753 doi: 10.1242/dev.170753.
- 88 Sanz-Navarro M, Delgado I, **Torres M**, Tuija M. Mustonen, Frederic Michon and David P. Rice (2019). Dental epithelial stem cells express developmental regulator Meis1. *Frontiers in Physiology* in pre-print: doi: 10.3389/fphys.2019.00249
- 89 Covadonga Díaz-Díaz and **Torres M** (2019) Insights into the quantitative and dynamic aspects of Cell Competition. *Curr Opin Cell Biol.* 60:68-74. doi: 10.1016/j.ceb.2019.04.003.
- 90 Cristina Villa del Campo and **Torres M** (2019) Changing the Rules of the Game: How Winners Become Losers during Oncogenic Cell Selection. *Cell Stem Cell*, 25:299-300



- 91 Latorre-Pellicer A, Lechuga-Vieco AV, Johnston IG, Hämäläinen RH, Pellico J, Justo-Méndez R, Fernández-Toro JM, Clavería C, Guaras A, Sierra R, Llop J, Torres M, Criado LM, Suomalainen A, Jones NS, Ruíz-Cabello J, Enríquez JA (2019). Regulation of Mother-to-Offspring Transmission of mtDNA Heteroplasmy. *Cell Metabolism* 30:1120-1130. doi: 10.1016/j.cmet.2019.09.007
- 92 Lioux G, Liu, X, Temiño S, Oxendine M, Ayala E, Ortega S, Kelly RG, Oliver G and **Torres M** (2020). A Second Heart Field-derived vasculogenic niche contributes to cardiac lymphatics. *Developmental Cell*, 52:350-363. doi: 10.1016/j.devcel.2019.12.006.
- 93 Sánchez-Guijo F, García-Olmo D, Prósper F, Martínez S, Zapata A, Fernández-Avilés F, Toledo-Aral JJ, **Torres M**, Fariñas I, Badimón L, Labandeira-García JL, García-Sancho J, Moraleda JM (2020) Spanish Cell Therapy Network (TerCel): 15 years of successful collaborative translational research. *Cytotherapy*. 22:1-5. doi: 10.1016/j.jcyt.2019.11.001
- 94 Delgado I, López-Delgado AC, Roselló-Díez A, Giovinzazo G, Cadenas V, Fernández-de-Manuel L, Sánchez-Cabo F, Anderson MJ, Lewandoski M and **Torres M** (2020). Proximo-distal positional information encoded by an Fgf-regulated gradient of homeodomain transcription factors in the vertebrate limb. *Science Advances*, 6(23), EAAZ0742.
- 95 Nicolás-Ávila JA, Lechuga-Vieco AV, Esteban-Martínez L, Sánchez-Díaz M, Díaz-García E, Santiago DJ, Rubio-Ponce A, Li JL, Balachander A, Quintana JA, Martínez-de-Mena R, Castejón-Vega B, Pun-García A, Través PG, Bonzón-Kulichenko E, García-Marqués F, Cussó L, A-González N, González-Guerra A, Roche-Molina M, Martín-Salamanca S, Crainiciuc G, Guzmán G, Larrazabal J, Herrero-Galán E, Alegre-Cebollada J, Lemke G, Rothlin CV, Jimenez-Borreguero LJ, Reyes G, Castrillo A, Desco M, Muñoz-Cánoves P, Ibáñez B, **Torres M**, Ng LG, Priori SG, Bueno H, Vázquez J, Cordero MD, Bernal JA, Enríquez JA, Hidalgo A (2020). A Network of Macrophages Supports Mitochondrial Homeostasis in the Heart. *Cell* S0092-8674(20)31073-4. doi: 10.1016/j.cell.2020.08.031.
- 96 Liu X, De la Cruz E, Gu X, Balint L, Oxendine-Burns M, Terrones T, Ma W, Kuo HH, Lantz C, Bansal T, Thorp E, Burrige E, Jakus Z, Herz J, Cleaver O, **Torres M** and Oliver G (2020). Lymphoangiocrine signals promote cardiac growth and repair. *Nature*, 588(7839):705-711. doi: 10.1038/s41586-020-2998-x
- 97 López-Delgado AC, Delgado I, Cadenas V, Sánchez-Cabo F, and **Torres M** (2021). Axial skeleton anterior-posterior patterning is regulated through feedback regulation between Meis transcription factors and retinoic acid. *Development*, 148: dev193813. doi: 10.1242/dev.193813
- 98 Cathiard L, Fraulob V, Lam D, **Torres M**, Winkelmann J and Krezel W (2021) Investigation of dopaminergic signalling in Meis homeobox 1 (Meis1) deficient mice as an animal model of restless legs syndrome. *Journal of Sleep Research*, 30(5):e13311. doi: 10.1111/jsr.13311
- 99 Esteban-Martínez L, **Torres M**. (2021) Metabolic regulation of cell competition. *Developmental Biology*, 475:30-36. doi: 10.1016/j.ydbio.2021.02.011
- 100 Delgado I, Giovinzazo G, Temiño S, Gauthier Y, Balsalobre A, Drouin J and **Torres M** (2021). Control of mouse limb initiation and antero-posterior patterning by Meis transcription factors. *Nature Communications*, 12:3086. doi: 10.1038/s41467-021-23373-9
- 101 Durán-Alonso B, Vendrell V, López-Hernández I, Alonso MT, Martín DM, Giraldez F, Carramolino L, Giovinzazo G, Vázquez E, **Torres M**, Schimmang T (2021). Meis2 is required for inner ear formation and proper morphogenesis of the cochlea. *Frontiers in Cell and Developmental Biology*, 9, 679325
- 102 Sendra M, Domínguez JN, **Torres M\***, Ocaña OH\* (2022). Dissecting the complexity of early heart progenitor cells. *Journal of Cardiovascular Development and Disease*, 9, 5. \*Co-corresponding authors

- 103** Esteban I, Schmidt P, Desgrange A, Raiola M, Temiño S, Meilhac SM, Kobbelt L, and **Torres M** (2022). Pseudo-dynamic analysis of heart tube formation in the mouse reveals strong regional variability and early left-right asymmetry. *Nature Cardiovascular Research*, 1, 504–517.
- 104** M Torres and I Esteban (2022). A quantitative 3D Atlas of Heart Tube Formation. *Nature Cardiovascular Research*, doi.org/10.1038/s44161-022-00078-w
- 105** Sendra M, Mañes J, Domínguez JN, **Torres M**. (2022) Live Imaging of Early Cardiac Progenitors in the Mouse Embryo. *Journal of Visual Experiments* doi: 10.3791/64273.
- 106** Suzanne, M and **Torres M** (2022) Editorial overview: New insights into epithelial dynamics: From tissue homeostasis to morphogenesis. *Current Opinion in Genetics and Development*. 75:101926. Doi: 10.1016/j.gde.2022.101926
- 107** Sendra, M., dD. Hourcade, Juan, Temiño, S, Sarabia, A. J., Ocaña, O. H., Domínguez J. N., and **Torres M**. (2023) Cre recombinase microinjection for single–cell tracing and localised gene targeting. *Development*, <https://doi.org/10.1242/dev.201206>
- 108** Raiola, M, Sendra M and **Torres M** (2023). Imaging approaches and the quantitative analysis of heart development. *Journal of Cardiovascular Development and Disease*, 10:145. <https://doi.org/10.3390/jcdd10040145>
- 109** Yadav, U.S., Biswas, T., Singh, P.N., Gupta P, Chakraborty S, Delgado I, Zafar H, Capellini TD, **Torres M**, Bandyopadhyay, A. (2023). Molecular mechanism of synovial joint site specification and induction in developing vertebrate limbs. *Development*, 150(13), dev201335
- 110** Díaz Del Moral S, Benaouicha M, Villa Del Campo C, **Torres M**, Wagner N, Wagner KD, Muñoz-Chápuli R, Carmona R. (2023). Cardiomyocyte-Specific Wt1 Is Involved in Cardiac Metabolism and Response to Damage. *Journal of Cardiovascular Development and Disease* 10:211. doi: 10.3390/jcdd10050211
- 111** Mañanes D, Rivero-García I, Jiménez D, **Torres M**, Sancho D, Torroja C, Sánchez-Cabo F. (2024). SpatialDDLs: An R package to deconvolute spatial transcriptomics data using neural networks. *Bioinformatics* 40(2):btac072. doi: 10.1093/bioinformatics/btac072.
- 112** Dvoretzkova E, Ho MC, Kittke V, Neuhaus F, Vitali I, Lam DD, Delgado I, Feng C, **Torres M**, Winkelmann J and Mayer C. (2024) Spatial enhancer activation influences inhibitory neuron identity during mouse embryonic development. *Nature Neuroscience* doi: 10.1038/s41593-024-01611-9
- 113** Valverde-Lopez JA, Li-Bao L, Sierra R, Santos E, Giovinazzo G, Díaz-Díaz C, and **Torres M**. (2024) P53 and BCL-2 family proteins PUMA and NOXA define competitive fitness in Pluripotent Cell Competition. *PLOS Genetics* 20(3):e1011193. doi: 10.1371/journal.pgen.1011193
- 114** Li-Bao L, Díaz-Díaz C, Raiola M, Sierra R, Temiño S, Moya FJ, Rodríguez-Perales S, Santos E, Giovinazzo G, Bleckwehl T, Rada-Iglesias A, Spitz F, **Torres M**. Modular regulation of Myc transcription by a topologically defined enhancer cluster dedicated to pluripotency and early embryonic expression. *Nature Communications* (In press)

### **Book Chapters**

- 115** **M. Torres** and A. Mansouri (1994). "Gene Targeting by Homologous Recombination in Embryonic Stem Cells". In: "Cell Biology: A Laboratory Handbook". Ed. by J.E. Celis. Academic Press.
- 116** **M. Torres** (1997). La modificación dirigida del genoma de ratón y su repercusión en biomedicina. Revista de la Real Academia Ciencias, 91, 147-152.

- 117 M. Torres** y A. Serrano (1998). Genética y terapia de la diabetes. *Investigación y Ciencia*, 263, 40-41.
- 118 M. Torres** (1998) "The use of morula aggregation to generate germline chimeras from genetically modified Embryonic Stem Cells". In: "Microinjection and Transgenesis. Strategies and Protocols". Eds. A.Cid and A.García Carrancá. Springer-Verlag.
- 119 M. Torres** (2001) Obtención, cultivo y diferenciación de Células Madre Embrionarias. In: "Internet Salud Digital" Ed. J. Rodés
- 120 M. Torres** "Modelos animales de enfermedad". In: "Medicina Interna" Eds. J.Rodés, y J.Guardia. Masson (2004)
- 121 Silvia Martín-Puig and M. Torres** "Molecular and cellular development of the heart". In: Fuster's *Hurst the Heart*, 14<sup>th</sup> edition. Eds. Fuster V, Walsh R, Harrington, R. (McGraw-Hill, 2017)
- 122 M. Torres**, Coordinator of the Heart Development Section and author of the chapter: "The molecular basis of cardiac embryogenesis" and in the *European Society of Cardiology Textbook of Cardiovascular Medicine* 3rd edition. Eds., Camm, AJ, Luscher, TF, Maurer G, Serruys PW (Oxford University Press, 2018)

### *Outreach publications*

- M. Torres** (1998) "Células a la carta" ABC cultural
- M. Torres** (2000) "El ADN: La doble hélice de la Vida" EL CULTURAL de EL MUNDO
- M.Torres** (2001) "Primates transgénicos" EL CULTURAL de EL MUNDO

### GRANTS

- Identificación y caracterización funcional de nuevas proteínas de la vía secretora mediante trampas génicas en células ES de ratón. Agency: **Comunidad Autónoma de Madrid**, ref. 07B/0022/1999, 2000, **PI: M. Torres**
- Regulación y función de los genes de la familia homeobox MEIS/PBX. Agency: **Comunidad Autónoma de Madrid**, ref. 08.6/0032/20001, 2001-2002, **PI: M. Torres**
- Estudio del control de la diferenciación y muerte celular programada por factores de transcripción de la familia TALE-homeobox". Agency: **CICYT**, ref. SAF00-0160, 2000-2003, **PI: M. Torres**
- Genómica Funcional en Modelos Vertebrados para el Estudio Comparado de Genes de Desarrollo Embrionario. Agency: **Ministry of Science**, ref: GEN2001-4846-C05-04, 2002-2004, **PI: M. Torres** (Coordinator: G. Morata)
- Los genes Meis en el desarrollo y enfermedad: análisis en modelos de modificación genética dirigida en el ratón y en células madre embrionarias. Agency: **Ministry of Science**, ref. SAF2003-04317, 2003-2006 **PI: M. Torres**
- Regulación de la Organogénesis en Vertebrados por Factores Homeodominio. Agency: **Ministry of Science**, ref. BFU2006-10978, 2007-2009 **PI: M. Torres**
- Computerized 4-Dimensional Clonal Analysis of the Developing Mouse Limb. Agency: **Human Frontiers Science Program**, ref RGP8/2004, 2004-2007. **PI and International Coordinator: Miguel Torres**
- "Integrated technologies for in-vivo molecular imaging" Agency: **EU FP6**, ref LSHG-CT-2003-5032259. 2003-2008. **PI: Miguel Torres** (Coordinator: E N Economou, FORTH, Crete)
- CELDEV-CM: Bases celulares del desarrollo: Linajes embrionarios y competición celular. Agency: **Comunidad de Madrid**, ref. S-SAL0190-2006, 2007-2010, **PI: M. Torres**, (Coordinator: Ginés Morata, CBM-CSIC, Madrid)

- Opti-heart: Optimization of 3D image technologies for the study of normal and abnormal heart development. Agency: **La Marató TV3**, ref. 082031, 2009-2012, PI: J.J. Sanz-Ezquerro (CNIC, Madrid); Co PI: James Sharpe (CRG-Barcelona)
- Red de terapia celular RETICS TerCel. Agency: **FIS, ISCIII**, Ref: RD06/0010/0008, 2007-2012, **PI: M. Torres** (Coordinator: J.M. Moraleda, Hospital U. Virgen de la Arrixaca, Murcia)
- Meis and Pbx homeobox genes in development and disease. Agency: **Ministry of Science (MICINN)**, ref. BFU2009-08331, 2010-12. **PI: M. Torres**
- COST Action: on HOX and TALE transcription factors in Development and Disease. Agency: COST – European Cooperation in the field of Scientific and Technical Research (**EU RTD FP7**), ref. BM0805, 2009-2013, **PI and International Chair for 32 groups from 18 countries: M. Torres**
- EU Initial Training Network CardioNet.- Translational Training network on the Cellular and Molecular Bases of Heart Homeostasis and Repair. Agency: **EU FP7**, ref. 28600. 2012-2015. **PI: M. Torres** (Coordinator, E. Lara)
- Severo Ochoa Award to CNIC. Agency: **Ministry of Science and Innovation**. Ref. SEV-2011-0052. 2012-2015. **Co-PIs: Valentín Fuster and M. Torres**
- Comunidad de Madrid: "CellDD, lineages and cell competition in development and disease" 2012-2015 **PI: M.Torres** (Coordinator, G. Morata)
- Genome regulation by the Hox-TALE transcription factor network in development and disease. Agency: **Ministry of Science and Innovation**. Ref. BFU2012-31086. 2013-2015. **PI: M. Torres**
- Preparacion de propuesta para European Industrial Doctorate Training Network 4DHEART Agency: **Ministry of Science and Innovation**. Ref. EUIN2015-62897. 2015-2016. **PI: M. Torres**
- Severo Ochoa Award to CNIC. Agency: **Ministry of Science and Innovation**. Ref. SEV-2015-0505. 2016-19 **M. Torres is PI of 1/10** reference groups in the application.
- Transcriptional control of heart development and its impact in heart disease and repair mechanisms. Agency: **Ministry of Science and Innovation**. Ref. BFU2015-71519-P. 2016-2018 **PI: M. Torres**.
- CELMOVES: Analysis of the Cellular basis of Morphogenesis in vertebrates. Agency: **Ministry of Science and Innovation**. Ref. BFU2015-70193-REDT. 2016-2017. **PI and coordinator of 6 national groups: M. Torres**
- SMART: Striatal development and Meis1 Action in ResTless Legs Syndrome. Agency: **Ministry of Science and Innovation**. Ref. ERA NET NEURON II- PCIN-2015-020. 2015-2018. **PI: M. Torres**
- Initial Training Network-4D analysis of heart development and regeneration using advanced light microscopy. **EU Horizon 2020**, Ref. H2020-MSCA-ITN-2016-722427. 2016-20 **PI and coordinator of 7 international institutions: M. Torres**
- Cell Therapy Network RETICS. Agency: **FIS, ISCIII**, Ref: RD16/0011/0019. 2017-21 **PI: M.Torres**
- Redox Regulation of Cardiomyocyte Renewal. 2018-2022. **Leducq Foundation Transatlantic Networks**, ref. 17CVD04. **Coordinators of 7 international institutions, H. Sadek (Dallas) and M. Torres**
- CNIC Internal Grants. Identification of therapeutic targets to rescue protein loss that drives the arrhythmogenic phenotype in recessive catecholaminergic polymorphic ventricular tachycardia. 2017-2019. **coPI M.Torres (PI S. Priori)**
- REANIMA-CM: Bases moleculares y celulares de la regeneración cardíaca: desde los modelos animales al corazón humano. 2018-2021, **Madrid Regional Government**. B2017/BMD-3875. **Coordinator of 6 national research groups: M. Torres**
- PROMEIS: Formacion de patrón y morfogénesis de órganos de mamíferos por los factores de transcripción Meis. 2019-2022 **Ministerio de Ciencia Educación y Universidades** PGC2018-096486-B-I00.

- REANIMA-EU: New-generation cardiac therapeutic strategies directed to the activation of endogenous regenerative mechanisms. 2020-2024. **European Commission** SC1-BHC-07-2019. Ref. 874764. **Coordinator of 12 international institutions: M. Torres**
- CARADIOBOOST-CM: Bioingeniería de células satélite de músculo esquelético como nueva estrategia de diferenciación a cardiomiocitos y regeneración cardiaca. 2023-2026, **Madrid Regional Government**. B2022/BMD-7245. **M. Torres, coordinator of 5 national research groups.**
- CIBER-CV: Investigación traslacional sobre las bases embrionarias y los mecanismos celulares y moleculares implicados en la protección y regeneración de los tejidos cardiovasculares. 2023- . **ISCIII**. CB22/11/00021.
- EMERGENT: The cellular/molecular basis of organogenesis during mammalian development. **Agencia Estatal de Investigación**. 2023-2025. PID2022-140058NB-C31. **PI: M. Torres**
- REACTIVA: The transcriptional regulation of cardiomyocyte polyploidization and its relevance in cardiac regeneration. **European Research Council**. Advanced Grant ref. 101142005. **PI: M. Torres**

## TEACHING

### Spanish Postgraduate and Master Courses

- |                 |  |
|-----------------|--|
| 1991, 1995-2003 | Proliferación y diferenciación celular y desarrollo. CIB (CSIC), U Alcalá de Henares, UC Madrid, UA Madrid   |
| 1996            | Biología del desarrollo. U. Valladolid   |
| 1996-2005       | Activación celular y apoptosis en el sistema inmune. UA Madrid   |
| 1997-1998       | Bases bioquímicas y moleculares de la función celular III. UA Madrid   |
| 1998            | Biotecnología. UA Madrid   |
| 1998-2000       | Avances en biología del desarrollo. UA Madrid  |
| 2000            | Biotecnología: una Mirada al futuro. U Santiago de Compostela  |
| 2001            | La revolución biomédica: los diez últimos/próximos años. U Valladolid  |
| 2001            | Diferenciación y desarrollo. U de Salamanca  |
| 2001            | El genoma humano al descubierto. U Santiago de Compostela  |
| 2002            | Biología Molecular del desarrollo. UA Madrid   |
| 2004            | VIII Curso nacional de trasplante de órganos, células madre y terapia. U Zaragoza                            |
| 2005            | Las fronteras de la Biología Molecular. Centro de Ciencias de Benasque. Huesca                               |
| 2008-2024       | Cardiovascular Diseases Module (BMM9), Master on Molecular Biomedicine, UA Madrid (Coordinator and lecturer) |
| 2017            | Universidad Menéndez Pelayo-CIB “Master in Molecular and Cellular Integrative Biology”                       |

### International Courses

- |      |  |
|------|--|
| 1994 | Manipulating mouse embryonic stem cells. INSERM, Le Vesinet, Paris, France   |
| 1995 | New Trends in Molecular Biotechnology: Basic and Applied Aspects. U Louvain-La-Neuve, Brussels, Belgium                                |
| 1995 | EMBO practical course on mouse and chicken development. Biophysical Chemistry Institut, Max Planck Society, Göttingen, Germany         |
| 1999 | Atelier transgénese, INSERM, Toulouse, France  |
| 1999 | Advanced Course in Molecular Biology Techniques. Instituto Venezolano de Investigaciones Científicas, Caracas, Venezuela               |
| 2001 | Biology and Mathematics: Mathematics in Embryonic Development and Cancer Escuela de Matemáticas "Lluís Santaló" UIMP, Santander, Spain |
| 2006 | Basic Molecular Processes in Organisms and their Pathology. Escuela de Biología Molecular “Eladio Viñuela. UIMP, Santander, Spain      |
| 2010 | Graduate School Advance Course on Molecular Medicine-Multidisciplinary Solutions to Medical Challenges, BIOCENTER, Oulu, Finland       |
| 2019 | Biomedicine course for postgraduates, Gulbenkian Research Institute, Lisbon, Portugal  |

**SELECTED INVITED LECTURES**

- 2000: Simposio internacional Fundación Ramón Areces: “Transgénesis animal en biología, medicina y biotecnología. Madrid
- 2001 14th Congress of the International Society of Developmental Biology, Kioto, Japón
- 2002 Workshop on “Limb Development”. Fundación Juan March, Madrid
- 2002 Annual meeting of the French Society of Developmental Biology, Toulouse
- 2003 Workshop on “Developmental Mechanisms in Vertebrate Organogenesis”. Fundación Juan March, Madrid
- 2003 EMBO Workshop "Boundaries in Development: 30 years of Progress" EMBL, Heidelberg, Alemania
- 2004 8th International Conference on Limb Development and Regeneration. Dundee, UK
- 2004 ESF conference on Cellular and Molecular Basis of Regeneration. San Feliu, España.
- 2004 II CRG Annual Symposium on "The cell in Development"
- 2005 British Council Opening Doors Workshop: New Imaging Techniques in Biology, Nerja (Malaga), Spain
- 2006 Workshop on Homeodomain Proteins, Hematopoietic Development and Leukemias, Riva del Garda, Italy
- 2006 9th International Conference on Limb Development and Regeneration. Awaji, Japan
- 2007 British Council "Opening Doors" workshop: "Regeneration and Cell Therapy" Cardona, Spain
- 2009 Symposium on "Tissue Specification and Organogenesis", Gulbenkian Foundation, Lisbon, Portugal
- 2009 Heart Repair – 3rd Annual General Meeting, Berlin, Germany
- 2009 American Heart Association Scientific Sessions, Orlando
- 2010 EU Marie Curie symposium on "Developmental Signaling Networks"
- 2010 11th International Conference of Limb Development and Regeneration, Williamsburg, USA
- 2010 Gordon Research Conference on "Molecular Mechanisms In Lymphatic Function & Disease", Barga, Italy
- 2011 XXXIV Congreso de la Sociedad Española de Bioquímica y Biología Molecular, Barcelona, Spain
- 2011 VI Congreso de la Sociedad Española de Terapia Génica y Celular, Zaragoza
- 2011 EMBO Workshop - Lineage Commitments: Emphasis on Extraembryonic-Embryonic Interfaces, Leuven, Belgium
- 2011 NYAS Meeting: Evolving Challenges in Promoting Cardiovascular Health, Barcelona
- 2012 12th International Conference on Limb Development & Regeneration Meeting: HoxA cluster epigenetic regulation underlies cell-autonomous generation of late limb proximodistal pattern. Quebec, Canada
- 2012 45th Annual New York Cardiovascular Symposium: Major Topics in Cardiology Today: Embryogenic Development of the Heart: Implications for Stem Cell Regeneration in the Adult. New York, United States of America
- 2012 "Cell competition in the mammalian epiblast eliminates cells with lower Myc levels". Cornell University, NY, USA
- 2013 "Myc-driven Cell Competition in the Mammalian Embryo" Institute of Biomedical and Biomolecular Science (IBBS) Portsmouth, UK
- 2013 46th Annual New York Cardiovascular Symposium: Major Topics in Cardiology Today: Embryonic Development of the Heart: The Competitive Nature of Cardiac Development
- 2013 Hox-related and unrelated functions of TALE-homeodomain transcription factors during mammalian organogenesis. International Conference: Hox and TALE Transcription factors in Development and Disease. Egmond aan Zee, The Netherlands
- 2013 Andalucía International University Current Trends in Biomedicine Conference on 2The Hemato-Vascular System: Development and Disease. Clonal Analysis of the Early Endothelial and Hematopoietic Lineages in the Mouse. Baeza, Spain
- 2013 "Cell Competition in Mammalian Organogenesis". Second Meeting of the Portuguese society for Developmental Biology. Lisbon, Portugal
- 2014 Cell competition and tissue homeostasis in Mammals. Max-Planck Center for Molecular Cell Biology and Genetics. Dresden, Germany

- 2014 Cell Competition in Mammalian Development and Tissue Homeostasis. 47<sup>th</sup> Meeting of the Japanese Society for Developmental Biology. Nagoya, Japan
- 2014 Cell Competition in Mammalian Development and Tissue Homeostasis. The 2014 Santa Cruz Developmental Biology Meeting, UCSC
- 2014 Jonah Platt Stem Cell Lecture Series. Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research, UCSF
- 2014 Role of Anabolism Regulation in Cardiac Development and Homeostasis. American Heart Association Scientific Sessions 2014, Chicago, USA
- 2015 Speaker at the Max-Planck Institute for lung and heart disease student's symposium, Ringberg Castle, Munich
- 2015 Keynote speaker at the Congress of the Society for Cell Biology, Spain
- 2015 Speaker of the Presidential symposium at the Congress of the Society for Developmental Biology, USA
- 2015 Speaker at the 1<sup>st</sup> Symposium of Cell Competition in Development and Cancer, Kyoto
- 2016 Simposio Internacional: Cell competition, apoptosis and cancer. Fund. Ramón Areces
- 2016 Heart Failure Winter Meeting. ESC. Les Diablerets, Suiza
- 2016 Janelia Workshop "Imaging Mouse Development" VA, USA
- 2016 Myology Congress 2016. Lyon, France
- 2016 39th Annual Meeting of the Molecular Biology Society of Japan. Mishima, Japan
- 2016 The Allied Genetics Conference 2016 (TAGC), Orlando, USA
- 2017 The Stem Cell Institute at the University of Minnesota external seminar series. USA
- 2017 International Society for Developmental Biology Congress, Singapore
- 2017 Gordon Research Conference on Developmental Biology, Mount Holyoke, MA, USA
- 2017 14th International Limb Development and Regeneration Conference, Edinburgh, UK
- 2017 3<sup>rd</sup> International Symposium on Cell Competition, Hokkaido Univ., Sapporo, Japan
- 2018 EMBO workshop "Imaging Mouse Development", EMBL, Heidelberg (Germany)
- 2018 Gordon Research Conf., Cardiac Regulatory Mechanisms, Colby-Sawyer College, NH (USA)
- 2018 Keynote speaker at the Mexican Developmental Biology Society Congress, Puebla, Mexico
- 2019 Keystone Symposium on *Cellular Plasticity: Reprogramming, Regeneration, and Metaplasia*. Keystone, USA
- 2019 International Symposium on Cardiovascular Regeneration and Repair, Madrid, Spain
- 2019 Symposium on Cell Competition in Development and Disease, Lausanne, Switzerland
- 2019 EMBO members Meeting 2019. Heidelberg, Germany
- 2020 Congress of the Spanish Society of Cardiology, virtual meeting
- 2021 EMBO "Ascona" virtual meeting on Cardiomyocyte Biology
- 2021 Virtual Congress of the European Society of Human Genetics
- 2022 Cardiovascular Bioengineering Meeting. CVBE DZHK/NIH. Goettingen, Germany.
- 2022 20th International Conference of the International Society of Differentiation-British Society for Developmental Biology. Malta
- 2022 Janelia/HHMI Conference "Imaging Mouse Development". Janelia Institute, Virginia, USA
- 2022 Cardiovascular Health Congress 2022. Spanish Society for Cardiology
- 2023 International Symposium on Myocardial Regeneration in chronic Heart Failure. El Gouna, Egypt
- 2023 New frontiers in cardiac and vascular biology symposium. Weizmann Institute, Israel
- 2023 37th Meeting of the ISHR-European Section. Porto, Portugal
- 2023 Congress of the European Society of Cardiology. Amsterdam, The Netherlands
- 2024 2nd JST International Symposium on Dynamics of Cellular Interactions in Multicellular Systems. Kyoto, Japan
- 2024 Foster Talks seminar series at the Department of Physiology, Development and Neuroscience (PDN) at the University of Cambridge

## COURSES AND MEETINGS ORGANIZED

- 1995 EMBO practical course on mouse and chicken development". Max-Planck-Institute of Biophysical Chemistry. Goettingen, Germany
- 1999 I Simposium nacional de transgénesis animal. CNB, CSIC. Madrid, Spain

- 2000 International Symposium on Animal Transgenesis in Biology, Medicine and Biotechnology. Fundación Ramón Areces, Madrid, Spain
- 2001-3 Workshop: Avances en Biología Molecular por Jóvenes Investigadores en el Extranjero. Centro Nacional de Biotecnología, CSIC, Madrid, Spain
- 2003 Juan March Meeting on Developmental Mechanisms in Vertebrate Organogenesis. Madrid, Spain
- 2005 British Council "Opening Doors" Workshop: New Imaging Techniques in Biology. Nerja, Málaga, Spain
- 2006 EMBO Workshop on "Homeodomain Proteins, Hematopoietic Development and Leukemias" Riva del Garda, Italy
- 2007 CNIC-UNIA Workshop on the Regulation of Pluripotency during life cycle: implications for embryonic development and regenerative medicine, Baeza, Spain
- 2008 CNIO Cancer Conference on Development and Cancer, Madrid, Spain
- 2008 10th International Conference on Limb Development and Regeneration, Euroforum and the Auditorium of San Lorenzo de El Escorial (Madrid), Spain
- 2009 Symposium on developmental biology from a cell biology and biophysics perspective. CNIC, Madrid, Spain
- 2009 Workshop on Hox and Tale Homeoproteins in Development and Disease, Carmona, Seville, Spain
- 2012 Symposium on "HOX and TALE Transcription Factors in Development and Disease", El Escorial, Madrid, Spain.
- 2014 Weinstein International Conference on Cardiovascular Development. Madrid
- 2016 International symposium: Cell competition, apoptosis and cancer. Fundación Ramón Areces. Madrid
- 2019 Limb Development and Regeneration: New tools for a Classic Model System, PRBB, Barcelona,
- 2019 European Developmental Biology Congress 2019. Alicante, Spain
- 2022 CNIC Conference: Cardiac Regeneration: from Mechanisms to Therapies. Madrid, Spain

#### PhD THESES SUPERVISED

- 2002 Cristina Clavería, Title: Análisis de la regulación de la muerte celular programada en *D. melanogaster* y su conservación en vertebrados, Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2003 Nadia Mercader, Title: Role and Regulation of Meis Genes during Proximodistal Limb Development in Vertebrates, Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2005 Valeria Azcoitia, Title: Genetic Analysis of the Homeobox gene Meis1 during mouse embryogenesis, Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2007 Carlos García-Arqués, Title: 4-D Computerized clonal analysis of the developing mouse limb, Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2010 Catalina Ana Rosselló Castillo, Title: Role of the homeobox gene Meis I in hematopoietic stem cell generation in the vertebrate embryo: a functional analysis, Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2010 Alberto Roselló Díez, Title: New genetic strategies to analyze cell behaviour and gene function in the mouse, Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude" / First National Award
- 2011 Clara García Andrés, Title: Identification and functional analysis of regulators of vertebrate limb pattern formation, Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2013 Daniel Mateos San Martín, Title: The DNA binding profile of TALE Proteins in the Embryo. Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2014 Cristina Villa del Campo, Title: Papel de la competición celular e el desarrollo del embrión de ratón. Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2017 Covadonga Díaz-Díaz, Title: Live analysis and function of Myc-mediated cell competition in mouse pluripotent stem cells. Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2019 Ghislaine Lioux: Retrospective clonal analysis of the developing mouse heart. Autonomous University of Madrid, Faculty: Science, First Class "Cum Laude"
- 2019 Alejandra Cristina López-Delgado. Meis transcription factors in axial development. Autonomous University of Madrid, Faculty: Science, First Class



- 2019 Noelia Muñoz-Martín. The role of Meis transcription factors in cardiomyocytes. Autonomous University of Madrid, Faculty: Science, First Class “Cum Laude”
- 2021 Jose Antonio Valverde. P53 and Puma in Pluripotent Cell Competition. Faculty: Science, Autonomous University of Madrid, First Class
- 2021 Ester de la Cruz Crespillo. Director Miguel Torres. The role of Meis transcription factors in the epicardium. Faculty: Science, Autonomous University of Madrid, First Class “Cum Laude”
2022. Isaac Esteban. Director Miguel Torres. Pseudodynamic analysis of heart tube formation in the mouse embryo. School of Telecommunication, Universidad Politécnica de Madrid, First Class “Cum Laude”
- 2022 Lin Li-Bao. Director Miguel Torres. Regulation of Myc expression in Mouse Pluripotent Stem Cells and its Relevance in cell Competition. Faculty: Science, Autonomous University of Madrid, First Class “Cum Laude”
- 2023 Miquel Sendra. The spatio-temporal sequence of cardiovascular precursor specification in the primitive heart tube of the mouse embryo. Faculty: Science, Autonomous University of Madrid, First Class “Cum Laude”
- 2023 Morena Raiola. A quantitative study of myocardial motion and deformation during early mouse morphogenesis. School of Telecommunication, Universidad Politécnica de Madrid, First Class “Cum Laude”

## PEER REVIEW

- 1996-present External reviewer for National and International Agencies in the evaluation of research grant applications and of scientific positions: Plan Nacional and ANEP (Spain), ICREA (Cataluña), IKERBASQUE (País Vasco), CAM (Madrid), NSF (USA), FONCYT (Argentina), FCT (Portugal), SFI (Ireland) and the European Commission (ERC)
- 6-times Member of the Grant Evaluation and follow-up Panels for the National Program of Molecular and Cellular Biology
- 1996-present Reviewer of manuscripts for Nature, Science, Developmental Cell, Cell Stem Cell, Science Advances, Nature Communications, PNAS, PLOs Biology, EMBO J, Development, Blood, Developmental Biology, Scientific Reports, Mechanisms of Development, Developmental Dynamics and others
- 2017, 2019 Evaluator for the “Canada Excellence Research Chairs”
- 2020 Member of the HCERES evaluation panel for the Institut Pasteur Department of Developmental Biology and Stem Cells

Madrid, April 2024