

Part A. PERSONAL INFORMATION		CV date		14/09/2021
First and Family name	Carlos Fernández Tornero			
ID number	26033172-R	Age	46	
Researcher codes	WoS Researcher ID	I-6888-2015		
	SCOPUS Author ID	6506689866		
	ORCID	0000-0001-5097-731X		

A.1. Current position

University/Institution	Consejo Superior de Investigaciones Científicas (CSIC)		
Department	Centro de Investigaciones Biológicas Margarita Salas (CIB)		
Address and country	Avda. Ramiro de Maeztu 9, 28040 Madrid (Spain)		
Phone number	918373112 - 4327	E-mail	cftornero@cib.csic.es
Current position	Group leader [Investigador científico CSIC]	From	2010
Keywords	Transcription, DNA repair, Cellular machines, RNA polymerases, Structural Biology, Cryo-EM, X-ray crystallography		

A.2. Education

PhD/BSc	University	Year
PhD in Molecular Biology	Autonomous University of Madrid (UAM)	2002
Bsc in Biochemistry	University of Granada (UGR)	1997

A.3. General indicators of scientific production quality

Publications (Pubmed): 33 (30 in Q1; 11 in D1)

Citations (WoS): 1157 total (average of 35 cites/publication; 80 cites/year in last 5 years)

h-index (WoS): 16

Stars in F1000: 12

Six-year research terms (*sexenios*): 3 (last awarded in 2015)

PhD Thesis supervision: 2 defended (2017 and 2019), 2 ongoing (start 2018 and 2019)

MSc Thesis supervision: 7 defended (2021, 2020, 2019, 2017, 2014, 2012, 2011)

Supervision (other): 7 postdocs, 4 technicians, 8 undergraduate students (BSc Thesis)

Part B. CV SUMMARY

Carlos Fernández Tornero is a **structural biologist** who combines electron cryomicroscopy (cryo-EM) and X-ray crystallography to study cellular machines. He currently leads the laboratory of 'Structure of Macromolecular Assemblies' at the Margarita Salas Center for Biological Research (CIB) of the Spanish National Research Council (CSIC). He has published 33 JCR articles, accumulating above 1,000 citations, in addition to a USA-licensed patent. His most relevant contributions include a dozen articles as first author/co-author, three of which he signed as corresponding co-author, in journals such as *Nature*, *Mol Cell*, *EMBO J* and *NSMB*. He also published eight articles as senior and corresponding author in journals such as *eLife*, *PNAS* and *NAR*.

He completed his PhD at CIB thanks to a FPU scholarship complemented by a stay with Nobel laureate Prof. Robert Huber, which provided him with training in **biochemistry and X-ray crystallography**. His PhD thesis received the Josep Tormo and Juan Abelló Pascual I awards. In 2002 he moved to Christoph Müller's laboratory at EMBL-Grenoble with an EMBO Long Term fellowship. He combined **cryo-EM**, trained by Bettina Böttcher and Guy Schoëhn, with X-ray crystallography to study **macromolecular complexes**. In 2007 he became Staff Scientist at EMBL-Heidelberg, where he obtained the cryo-EM structure of RNA polymerase III at sub-nanometer resolution.

At the end of 2009 he joined the CIB and started an **independent research group** in 2010. His studies initially focused on the X-ray structure of RNA polymerase I in its inactive state (*Nature*, 2013). He then applied cryo-EM to study the enzyme activation process and showed that the transition between the active and inactive states regulates ribosomal RNA synthesis (*eLife*, 2017). More recently, he uncovered the mechanism of UV light-induced DNA lesions detection by this enzyme (*PNAS*, 2018) and obtained the structure of the DNA repair endonuclease XPG in complex with DNA (*NAR*, 2020). In the last decade, he obtained **competitive funding** from the Spanish Ministry of Science, CSIC, Agence National de la Recherche (France), Ramón Areces Foundation and, given his interest in



technology transfer, through collaboration contracts with biotech companies such as PharmaMar. He received the distinction of 'Madrid Research Scientist Award' from CSIC in 2015.

His research is supported by a network of national and international collaborators, including researchers from the USA, the UK, France and Portugal. He has been invited to more than twenty conferences at national and international congresses and institutions, including one opening lecture. He evaluates grants for national and international agencies, as well as manuscripts for journals such as *Nature*, *NSMB*, *eLife*, *Nat. Comm.*, *Cell Res.*, *NAR*, *JBC*... He also teaches at different universities and in advanced international courses. Since 2018 he coordinates the 'Protein Structure and Function' Group of the SEBBM. In 2019 he was nominated by the CIB director as member of the CIB Scientific Advisory Committee.

Part C. RELEVANT MERITS

C.1. Publications

- Publications 2016-2021 -

1. Nguyen P.Q., Conesa C., Rabut E., Bragagnolo G., Gouzerh C., Fernández-Tornero C., Lesage P., Reguera J., Acker J.L. (2021) Ty1 integrase is composed of an active N-terminal domain and a large disordered C-terminal module dispensable for its activity in vitro. *J. Biol. Chem.* Online ahead of print. doi: 10.1016/j.jbc.2021.101093
2. Huecas S., Araújo-Bazán L., Ruiz F.M., Ruiz-Ávila L.B., Martínez R.F., Escobar-Peña A., Artola M., Vázquez-Villa H., Martín-Fontecha M., Fernández-Tornero C.*, López-Rodríguez M.L.*, Andreu J.M.* (2021) Targeting the FtsZ Allosteric Binding Site with a Novel Fluorescence Polarization Screen, Cytological and Structural Approaches for Antibacterial Discovery. *J. Med. Chem.* 64:5730-5745 (*Correspondence)
3. González-Corrochano R., Ruiz F.M., Taylor N.M.I., Huecas S., Drakulic S., Spínola-Amilibia M., Fernández-Tornero C.* (2020) The crystal structure of human XPG, the xeroderma pigmentosum group G endonuclease, provides insight into nucleotide excision DNA repair. *Nucleic Acids Res.* 48:9943-9958 (*Correspondence)
4. Huecas S., Canosa-Valls A.J., Araújo-Bazán L., Ruiz F.M., Laurents D.V., Fernández-Tornero C.*, Andreu J.M.* (2020) Nucleotide-induced folding of cell division protein FtsZ from *Staphylococcus aureus*. *FEBS J.* 287: 4048-4067 (*Correspondence)
5. Darrière T., Pilsel M., Sarthou M.K., Chauvier A., Genty T., Audibert S., Dez C., Léger-Silvestre I., Normand C., Henras A.K., Kwapisz M., Calvo O., Fernández-Tornero C., Tschochner H., Gadal O. (2019) Genetic analyses led to the discovery of a super-active mutant of the RNA polymerase I. *PLoS Genet.* 15:e1008157
6. Sanz-Murillo M., Xu J., Belogurov G.A., Calvo O., Gil-Carton D., Moreno-Morcillo M., Wang D.*, Fernández-Tornero C.* (2018) Structural basis of RNA polymerase I stalling at UV light-induced DNA damage. *Proc. Natl. Acad. Sci. USA* 115:8972-8977 (*Correspondence)
7. Fernández-Tornero C.* (2018) RNA polymerase I activation and hibernation: unique mechanisms for unique genes. *Transcription* 9:248-254 (*Correspondence)
8. Torreira E., Louro J.A., Pazos I., Gonzalez-Polo N., Gil-Carton D., Duran A.G., Tosi S., Gallego O.*, Calvo O.*, Fernandez-Tornero C.* (2017) The dynamic assembly of distinct RNA polymerase I complexes modulates rDNA transcription. *eLife* 6:e20832 (*Correspondence)
9. Canales A., Rösinger M., Sastre J., Felli I.C., Jiménez-Barbero J., Giménez-Gallego G., Fernández-Tornero C.* (2017) Hidden α -helical propensity segments within disordered regions of the transcriptional activator CHOP. *PLoS One* 12:e0189171 (*Correspondence)
10. Garavís M., Gonzalez-Polo N., Allepuz-Fuster P., Louro J.A., Fernandez-Tornero C., Calvo O. (2017; 2016 ePub) Sub1 contacts the RNA polymerase II stalk to modulate mRNA synthesis. *Nucleic Acids Res.* 45:2458-2471

C.2. Research projects

1. Structure and mechanisms of cellular machines that connect transcription with DNA repair and DNA integration. (PID2020-116722GB-I00) MICINN, 01/09/2021 - 30/08/2024. 242,000 €. Principal Investigator
2. Structural studies on biomedically-related aspects of transcription and its coupled DNA repair (BFU2017-87397-P) MICINN, 01/01/2018 - 30/09/2021. 200,618 €. Principal Investigator



3. Structural insights into yeast retrotransposons DNA integration mechanism(s) at genes transcribed by RNA polymerase III (ANR-17-CE11-0025) ANR, 01/12/2017 - 30/06/2022. 525,690.88 €. Team leader (Coordinator – Pascale Lesage, Hôpital Saint Louis, Paris, France)
4. RNA Life 2 (RED2018-102467-T). MICINN, 01/01/2020 - 31/12/2021. 22,000 €. Team leader (Coordinator – José Enrique Pérez Ortín, Universitat de Valencia)
5. Structural basis of tumour development associated to defects in the transcription interactome. Fundación Ramón Areces, 07/04/2015 - 06/04/2018. 128,000 €. Principal Investigator
6. RNA Life (BFU2015-71978-REDT). MICINN, 01/01/2016 - 30/11/2018. 25,000 €. Team leader (Coordinator – Susana Rodríguez Navarro, IBV-CSIC)
7. Structural and functional characterization of transcription and transcription-coupled DNA repair (BFU2013-48374-P). MICINN, 01/01/2014 - 30/06/2017. 260,150 €. Principal Investigator
8. Acquisition of an electron cryomicroscope with direct electron detector (CSIC13-4E-1700). MICINN, *Ayudas a infraestructuras y equipamiento científico-técnico 2014*. 643,000 €. Team leader (Coordinator – José María Valpuesta, CNB-CSIC)
9. Structural characterization of TFIIB and its role in RNA polymerase III transcription (EIC-EMBL-2011-0076). MICINN, 01/01/2012 - 31/12/2014. 129,447.59 €. Principal Investigator
10. Structural characterization of RNA polymerase I transcription system (BFU2010-16336). MICINN, 01/01/2011 - 31/12/2013. 157,300 €. Principal Investigator
11. Structural and functional characterization of the XPG endonuclease (200920I077). CSIC, 01/01/2010-31/12/2010. 30,000 €. Principal Investigator

C.3. Contracts with industrial companies

- Biochemical characterization of the interaction between the antitumour drug Yondelis and the DNA repair protein XPG. PharmaMar S.A., 01/01/2011 - 31/12/2018. 471,761 €. Principal Investigator
- N-terminal sequencing. Kymos Pharma Services S.L., 01/03/2016 - 28/02/2017. 24,865 €. Principal Investigator
- Amino-acid analysis and N-terminal sequencing. ALK Abelló S.A., 04/12/2015 - 03/12/2016. 18,469 €. Principal Investigator

C.4. Patents

Giménez Gallego G., Fernández Tornero C., Ramón González A., Varela Espinosa J., Alonso Lebrero J.L., Pivel Ranieri J.P. (2004) Production of heterologous proteins in a minimal culture medium. Estados Unidos de América 20040142414. CSIC e Industrial Farmacéutica Cantabria, S.A.

C.5. Speaker at meetings and conferences

2021. Odd Pols Meeting. Denver (USA)
2021. RNA Life Excellence Network Meeting. Seville
2020. IAS Focused Program on Transcription Mechanisms. Hong Kong
2019. Structural and Molecular Biology of the DNA Damage Response. Madrid
2019. 25 years of cryoelectron microscopy in Spain: a tribute to José L. Carrascosa. Madrid
2018. IAS Focused Program on Mechanisms of Transcription and its Regulation. Hong Kong
2018. Odd Pols Meeting. Toulouse (France)
2018. RNA Life Excellence Network Meeting. Salamanca
2017. FEBS3+ Meeting. Barcelona
2017. Congress of the Spanish Royal Society of Chemistry. Sitges
2017. Congress of the Spanish Biophysical Society. Sevilla
2017. MCIB workshop on Macromolecular Machines. Madrid
2017. RNA Life Excellence Network Meeting. Madrid
2016. IAS Focused Program on Mechanisms of Transcription and its Regulation. Hong Kong
2017. RNA Life Excellence Network Meeting. Valencia
2015. Congress of the Spanish Royal Society of Chemistry. La Coruña
2014. Total Transcription 2014 (Wellcome Trust). Hinxton (UK)
2014. International Union of Crystallography (IUCr) Congress. Montreal (Canada)
2014. EMBO Conference on Gene Transcription in Yeast. Sant Feliu de Guixols
2014. Congress of the Spanish Biophysical Society. Alcalá de Henares
2014. Meeting of the Spanish Protein Structure and Function Network. Madrid [Opening Lecture]
2013. Congress of the Spanish Biochemistry and Molecular Biology Society. Madrid



C.6. Seminars at national and international institutions

IBBTEC (Santander, 2019), CNIO (Madrid, 2018), IBFG (Salamanca, 2018), LBME-CNRS (Toulouse, France, 2017), IBMC (Porto, Portugal, 2017), CiQUS-USC (Santiago de Compostela, 2016), CIC-bioGUNE (Bilbao, 2015), IBV-CSIC (Valencia, 2015), Universidad de Jaén (2014), Universidad Complutense de Madrid (2014), CABD (Sevilla, 2014), IRB (Barcelona, 2014), Max Planck Institute for Biophysical Chemistry (Göttingen, Germany, 2012), LMB-MRC (Cambridge, UK, 2011)

C.7. PhD Thesis supervision

- Adrián Plaza Pegueroles. Ongoing (2019-2023). Autonomous University of Madrid. FPI Fellow
- Phong Nguyen. Ongoing (2018-2022). Co-direction with Juan Reguera (AFMB, Marseille)
- Marta Sanz Murillo. “The cryo-EM structure of RNA polymerase I stalled at UV light-induced damage unravels a new molecular mechanism to identify lesions on rRNA”. Autonomous University of Madrid (UAM), 2019. Honours Cum Laude. FPI Fellow
- Jaime Alegrio Louro. “Cryo-EM structures of free monomeric and Rrn3-bound RNA polymerase I unveil the structural changes in the transition from inactive dimers to the activated state”. Autonomous University of Madrid (UAM), 2017. Honours Cum Laude. FPI Fellow

C.8. Teaching

2012-2021. Master in Advanced Biotechnology. University of Málaga and International University of Andalucía. [Course coordinator since 2018]

2016-2021. Master in Molecular and Cellular Integrative Biology. International University Menéndez Pelayo (UIMP). [Module coordinator 2016-2019]

2014-2021. Master in Drug Discovery. Universities Complutense, CEU San Pablo, Alcalá de Henares

2016-2021. Master in Biomolecules and Cell Dynamics. Autonomous University of Madrid

2014-2018. Master in Cellular and Molecular Biology. University of Salamanca

2011-2013. International School on Biological Crystallization. Granada

2014. EMBO Course on Structure of Macromolecular Complexes. Grenoble (France)

C.9. Scientific advisory

Since 2019. Member of the CIB Internal Scientific Committee

2014-2015. Panel member of the Ramón y Cajal Programme (2 different calls)

Since 2010. Jury member in 8 PhD Thesis committees

Project reviewer: AEI/ANEP (Spain), DFG (Germany), ANR (France), NSC (Poland)

Manuscript referee: *Nature*, *NSMB*, *Cell Res.*, *Nat. Comm.*, *eLife*, *NAR*, *JBC*, *Sci. Rep.*, ...

C.10. Scientific management

Since 2015. Scientific supervisor of the Protein Chemistry Platform at CIB

2017-2018. Scientific supervisor of the Electron Microscopy Platform at CIB

Since 2018. Coordinator of the SEBBM Group on ‘Protein Structure and Function’

2012-2017. Organizer of the Seminar Program at CIB (6-12 speakers/year)

2013-2016. Organizer of the CIB Christmas Labday (9 speakers/year)

2011. Consultant for the Spanish Ministry of Science (MICINN)

Member of the SEBBM (since 2002), SBE (since 2012), RSEQ (since 2014)

C.11. Fellowships and awards

2015. Buenas Bazas de la Investigación Madrileña. Spanish National Research Council (CSIC)

2008. Ramón y Cajal. Ministerio de Ciencia e Innovación (*declined*)

2002. Long-Term EMBO Fellow. EMBO

2002. Josep Tormo Award for Young Scientist. Bruker Spain

2002. Juan Abelló Pascual I Award for PhD Thesis. Real Academia de Doctores

C.12. Outreach publications

- Fernández-Tornero C. (2017) Dime con quién andan tus proteínas y te diré qué hacen tus células. *Huffington Post* – 21 March
- Fernández-Tornero C. (2014) La síntesis del ARN: un proceso en el centro de la vida. *Boletín de la Institución Libre de Enseñanza* 95-96:77-87
- Fernández-Tornero C. (2013) Viaje al centro de la célula. *Huffington Post* – 31 October
- Fernandez-Tornero C. (2010) Nobel de Química 2009: estructura atómica de la maquinaria celular para sintetizar proteínas. *Anales de la Real Academia Nacional de Farmacia* 76:119-136