

**BIO-SKETCH**

Spanish, born in 1957 in Larache [Morocco]. Full Professor of Genetics (University of Seville) and Director of the Andalusian Centre of Molecular Biology and Regenerative Medicine (CABIMER). PhD in Seville in 1983 with a summer stay in Solar Energy Research Institute (Denver, CO, USA). After two postdocs in the Darmstadt Technical University (DE) and the NYU Medical Center (USA), he started his lab in late 1990 in the Department of Genetics of the University of Seville and moved in 2006 to CABIMER as co-founder and Vice-director of the Center.

His major research interests are RNA-mediated genome instability and recombinational DSB repair. His work has been pioneering in connecting RNA metabolism with DNA dynamics, and in the identification of R-loops and transcription-replication conflicts as a source of genome instability. His lab purified the THO complex uncovering a new function in mRNP biogenesis, R-loop-prevention and RNA-mediated genome instability, which initiated a new area of research. Lately, his lab uncovered new functions for known RNA-binding factors like UAP56/DDX39B, chromatin remodelers like SWI/SNF, FACT or SIN3A, DNA repair factors like BRCA2 or FANCD2, and recently for the DICER nuclease as suppressors of R-loops and RNA-mediated genome instability. In parallel, he has significantly contributed to the research on replication-born DNA break repair by sister-chromatid recombination, providing evidence for the role of cohesin and chromatin.

*Webpage:* <http://www.cabimer.es/web3/en/research-groups/genome-instability-cancer/>

**EDUCATION AND CURRENT POSITIONS**

- Full Professor of Genetics, University of Seville (*since 2004*)
- Director of CABIMER (*since April 1<sup>st</sup>, 2016*)
- Head of the *Genome Instability* laboratory (F. Biology, **US**, 1991-2006; CABIMER *since 2006*).
- Scientific Responsible of the *Genome Facility* of CABIMER, Seville (*since 2008*)
- Postdoctoral formation in Univ. Darmstadt, DE (2,5 years) and NYU Med Ctr, USA (4 years)
- Research stay in Solar Energy Research Institute, Denver, CO, USA (3 months) during PhD
- PhD in 1983, Department of Genetics, University of Seville

**HONORS AND AWARDS**

- 2021 *National Prize of Genetics* (Spanish Genetics Society)
- 2020 *Bandera de Andalucía* in Seville (Andalusian Government)
- 2019 *Gregor J Mendel Medal*, Mendel Lectures, Masaryk Univ./Mendel Found., Brno, Czech Repub.
- 2019 Prize (*national*) "*Fundación Francisco Cobos*" on Biomedical Research
- 2017 Elected Member of the *Royal Academy of Sciences of Seville*
- 2016 Research Award "Javier Benjumea Puigcerver", Fund. FOCUS-Abengoa/University of Seville
- 2013 *FAMA* Research Award to a "Research Trajectory", Univ. Seville
- 2010 *III Columela* Research Award in Health Sciences, Andalusian Government
- 2003 *Carmen & Severo Ochoa* National Research Award for Molecular Biology, Spain
- 2000 Elected EMBO Member
- 1994 Young Investigator Research Award of the *Royal Academy of Sciences of Seville*, Spain
- 1999-2020 Awarded grants ERCAdv (2015-21) & HFSP (1999-2003), among others

**SCIENTIFIC ACTIVITY AND ACHIEVEMENTS**

- > 220 original articles and reviews in ISI journals.
- H=69. Total citations ~17000; 45 articles with  $\geq 100$  citations (*Scopus*).
- In the 2% *Stanford-Elsevier* list of the world most cited authors (indeed in the top 0.2%)
- Pioneering work and the most highly cited in the field of R-loops (*DNA Repair* 127 (2023): 103502).
- Editor of the books *Molecular Genetics of Recombination* (Springer, 2007), *Methods in Molecular Biology on Homologous Recombination*, (Springer-Humana Press, 2020) and *Methods in Molecular Biology on R-loops* (Springer-Humana Press, 2022)
- > 15 book-chapters.
- 34 PhD Theses supervised + 5 under supervision; > 30 postdoctoral researchers supervised.
- Organizer of 13 International Workshops (1 EMBO/EMBL, 4 EMBO, 2 EURESCO, 2 J March, 2 UNIA, 2 J Monod, 1 CABIMER)

- > 180 Invited conferences in International meetings (*GRC, Keystone, FASEB, EMBO, J. Monod, Juan March, ESF/EURESCO, UNIA, R Areces, Abcam...*)
- Conferences at Research Centers all over the world (Europe, North America, South America, Asia)
- Senior/Associate Editor of *Mol. Cell. Biol.* (*since 2023*) and *Mol Genet Genom* (*since 2022*)
- Member of Editorial Boards of *eLife* (*since 2016*), *EMBO J* (s. 2009), *EMBO Rep* (s. 2009), *Mol Cell Biol* (2014-2023), *Mol Gen Genom* (2003-22), *Microb Cell* (s. 2014) and *Curr Genet* (2004-05).

## SCIENTIFIC COMMITTEES AND INSTITUTIONAL RESPONSIBILITIES

- Scientific Advisory/Evaluator Boards:
  - ICRC* (Brno, CZ) (2023)
  - Instituto de Investigaciones Biomédicas IIBM-CSIC, Madrid* (*since 2022*)
  - Institut of Molecular Biology IMB, Mainz, DE* (2021)
  - Erasmus University Medical Center, Rotterdam, NL* (2020)
  - Centro de Investigaciones Científicas Avanzadas CICA, Coruña, ES* (2020-24)
  - CEITEC* (Brno, CZ) (2009-2016)
  - Institut Université d'Hématologie CNRS/U. Paris, FR* (2012-18),
  - Institut Curie "Genotoxic Stress and Cancer Unit". Orsay, FR* (2013-18),
  - CABD, Seville, ES* (2016-2023),
  - EMBO Fellowship Committee* (2013-17),
  - EMBO Membership Committee* (2003-06),
  - EMBO Courses and Workshops Committee* (2023-2026),
  - Barcelona Supercomputing Center* (2011-2014),
  - ICREA Research Professor Program of Catalunya* (2006-10), (*since then, external evaluator*)
  - ATIP-Avenir INSERM, FR* (2010),
  - ANR French Program of Research, FR* (2017, 2023)
  - AERES Agency for evaluation of French Research centers, FR* (2009,13,14)
  - Wellcome Trust, UK* (2017,18)
  - Assesory Board of Biomedicine of Univ Internacional Andalucía (UNIA)* (*since 2022*)
  - Governing Board/Patronato Institut de Reserca Biomèdica (IRB, Barcelona)* (*since 2023*)
  - Invited to be part of ERC Adv Grant Panel in the period 2019-2021, but declined.*
- Coordinator/Director of Spanish Research Program of Molecular & Cell Biology (2001-05)
- Coordinator of Biology & Biomedicine, covering 21 research centers of the Spanish Research Council CSIC (2006-08), and Vice-coordinator (2008-09)
- Coordinator/Responsible of the "Genome Instability" Consolider (2007-13) and Excellence (2013-present) networks in Spain coordinating from 11 to 15 different research groups
- Spanish Representative in the Yeast Genet Mol Biol Fin Pol Committee (*since 2010*)
- Chair of Dept Genetics, University of Seville (2013-16)
- Chair of the Dept. Molecular Biology CABIMER (2006-16)
- Scientific Vice-director of CABIMER (3 years, 2008-09 & 2011-12)
- Vice-president of the Spanish Society of Genetics (2015-2018)
- Professor responsible of 32 Degree and >20 Master or PhD courses (*since 1990*)
- Spain National Representative at the ERC in Horizon Europe 2021-27 (2021, 6 months)
- External reviewer for ERC, AICR (IT), AECC (IT), ARC (FR), ICREA (CAT), MINECO, NIH-Israel Joint Program, etc.

### Former PhD and postdoctoral researchers at present PIs running their own labs:

Félix Prado (*CSIC, Seville*), Sebastián Chávez (*IBIS, Univ Seville*), Ralf E. Wellinger (*Dpt. Genetics, Univ Seville*), María Moriel-Carretero (*CBRM, Montpellier*), Felipe Cortés-Ledema (*CNIO, Madrid*), Pablo Huertas (*CABIMER, Seville*), Cristina González-Aguilera (*CSIC, Seville*), Tatiana García-Muse (*CABIMER, Seville*), Gonzalo Millán-Zambrano (*Dpt. Genetics, Univ Seville*).

## SELECTED CONFERENCES AS KEYNOTE SPEAKER

1. Jacques-Monod Conference on "Transcription and Genome Maintenance" (Opening/EMBO Lecture). Roscoff, FR (*programmed Sept 2024*)
2. 51<sup>st</sup> European Environmental Mutagenesis and Genomics Society Meeting (Opening Lecture), Málaga, ES 2023
3. French 3R (Recombination/Replication/Repair) Meeting (Opening Lecture), Presqu'île de Giens FR 2022

4. LIV Meeting of Argentinian Soc. of Biochem. & Mol. Biol. SAIB (Opening Lecture), Paraná, ARG 2018
5. XXXVIII Meeting of Chilean Soc. of Biochem. & Mol. Biol. ("Severo Ochoa" Keynote Lecture), Puerto Varas, CHL 2015
6. XL Meeting of Spanish Society of Genetics (Closing Lecture), Córdoba, ES 2015
7. XII European Conference on Fungal Genetics (ECFG12) (Opening Lecture), Sevilla, ES 2014
8. XLIV Meeting of Argentinian Soc. of Biochem. & Mol. Biol. SAIB (Keynote Lecture), Córdoba, ARG 2008
9. Jacques-Monod Conference on "Biological Responses to DNA Damage (EMBO Lecture). Roscoff, FR 2004

## FULL LIST OF ISI PUBLICATIONS

<https://pubmed.ncbi.nlm.nih.gov/?term=aguilera+andres+OR+aguilera+a+yeast+NOT+Aguilera+AR+NOT+Alexya+NOT+Angeles+OR+aguilera+gomez-gonzalez+pardo&sort=date>

## 25 SELECTED ORIGINAL PUBLICATIONS (*as senior/corresponding author*)

1. Bayona-Feliu A, Herrera-Moyano E, Badra-Fajardo N, Galván-Femenía I, Soler-Oliva ME, **Aguilera A. 2023**. The chromatin network helps prevent cancer-associated mutagenesis at transcription-replication conflicts. **Nat Commun.** 14(1):6890.
2. Camino LP, Dutta A, Barroso S, Pérez-Calero C, Katz JN, García-Rubio M, Sung P, Gómez-González B, **Aguilera A. 2023**. DICER ribonuclease removes harmful R-loops. **Mol Cell.** 83(20): 3707-3719.e5
3. San Martín-Alonso M, Soler-Oliva ME, García-Rubio M, García-Muse T, **Aguilera A. 2021** Harmful R-loops are prevented via different cell cycle-specific mechanisms. **Nat Commun.** 12(1):4451.
4. Bayona-Feliu A, Barroso S, Muñoz S, **Aguilera A. 2021** The SWI/SNF chromatin remodeling complex helps resolve R-loop-mediated transcription-replication conflicts. **Nat Genet.** 53(7):1050-1063
5. Pérez-Calero C, Bayona-Feliu A, Xue X, Barroso SI, Muñoz S, González-Basallote VM, Sung P, **Aguilera A. 2020**. UAP56/DDX39B is a major cotranscriptional RNA-DNA helicase that unwinds harmful R loops genome-wide. **Genes Dev.** 34(13-14):898-912.
6. Ortega P, Gómez-González B, **Aguilera A. 2019**. Rpd3L and Hda1 histone deacetylases facilitate repair of broken forks by promoting sister chromatid cohesion. **Nat Commun.** 10(1):5178.
7. García-Rubio M, Aguilera P, Lafuente-Barquero J, Ruiz JF, Simon MN, Geli V, Rondón AG, **Aguilera A. 2018**. Yra1-bound RNA-DNA hybrids cause orientation-independent transcription-replication collisions and telomere instability. **Genes Dev.** 32(13-14):965-977.
8. García-Pichardo D, Cañas JC, García-Rubio ML, Gómez-González B, Rondón AG, **Aguilera A. 2017** Histone Mutants Separate R Loop Formation from Genome Instability Induction. **Mol Cell.** 66(5):597-609.
9. Salas-Armenteros I, Pérez-Calero C, Bayona-Feliu A, Tumini E, Luna R, **Aguilera A. 2017**. Human THO-Sin3A interaction reveals new mechanisms to prevent R-loops that cause genome instability. **EMBO J.** 36(23):3532-3547.
10. Felipe-Abrio I, Lafuente-Barquero J, García-Rubio ML, **Aguilera A. 2015**. RNA polymerase II contributes to preventing transcription-mediated replication fork stalls. **EMBO J.** 34(2):236-50..
11. Bhatia V, Barroso SI, García-Rubio ML, Tumini E, Herrera-Moyano E, **Aguilera A. 2014**. BRCA2 prevents R-loop accumulation and associates with TREX-2 mRNA export factor PCID2. **Nature** 511(7509):362-5.
12. Herrera-Moyano E, Mergui X, García-Rubio ML, Barroso S, **Aguilera A. 2014**. The yeast and human FACT chromatin-reorganizing complexes solve R-loop-mediated transcription-replication conflicts. **Genes Dev.** 28(7):735-48.
13. Santos-Pereira JM, Herrero AB, García-Rubio ML, Marín A, Moreno S, **Aguilera A. 2013**. The Npl3 hnRNP prevents R-loop-mediated transcription-replication conflicts and genome instability. **Genes Dev.** 27(22):2445-58.
14. Castellano-Pozo M, Santos-Pereira JM, Rondón AG, Barroso S, Andújar E, Pérez-Alegre M, García-Muse T, **Aguilera A. 2013**. R loops are linked to histone H3 S10 phosphorylation and chromatin condensation. **Mol Cell.** 52(4):583-90.
15. Mischo HE, Gómez-González B, Grzechnik P, Rondón AG, Wei W, Steinmetz L, **Aguilera A\***, Proudfoot NJ\*. **2011**. Yeast Sen1 helicase protects the genome from transcription-associated instability. **Mol Cell** 41(1):21-32 (\* *co-corresponding*)
16. Gómez-González B, García-Rubio M, Bermejo R, Gaillard H, Shirahige K, Marín A, Foiani M, **Aguilera A. 2011**. Genome-wide function of THO/TREX in active genes prevents R-loop-dependent replication obstacles. **EMBO J.** 30(15):3106-19.
17. Moriel-Carretero M, **Aguilera A. 2010**. A postincision-deficient TFIIH causes replication fork breakage and uncovers alternative Rad51- or Pol32-mediated restart mechanisms. **Mol Cell.** 37(5):690-701.
18. De Piccoli G, Cortes-Ledesma F, Ira G, Torres-Rosell J, Uhle S, Farmer S, Hwang JY, Machin F, Ceschia A, McAleenan A, Cordon-Preciado V, Clemente-Blanco A, Vilella-Mitjana F, Ullal P, Jarmuz A, Leitao B, Bressan D, Ditiwala F, Papusha A, Zhao X, Myung K, Haber JE\*, **Aguilera A\***, Aragón L.\* **2006**. Smc5-Smc6 mediate DNA double-strand-break repair by promoting sister-chromatid recombination. **Nat Cell Biol.** 8(9):1032-4. (\* *co-corresponding*)
19. Prado F, **Aguilera A. 2005**. Impairment of replication fork progression mediates RNA polIII transcription-associated recombination. **EMBO J.** 24(6):1267-76.
20. Luna R, Jimeno S, Marín M, Huertas P, García-Rubio M, **Aguilera A. 2005** Interdependence between transcription and mRNP processing and export, and its impact on genetic stability. **Mol Cell.** 18(6):711-22.

21. Huertas P, **Aguilera A. 2003.** Cotranscriptionally formed DNA:RNA hybrids mediate transcription elongation impairment and transcription-associated recombination. **Mol Cell.** 12(3):711-21.
22. González-Barrera S, Cortés-Ledesma F, Wellinger RE, **Aguilera A. 2003.** Equal sister chromatid exchange is a major mechanism of double-strand break repair in yeast. **Mol Cell.** 11(6):1661-71.
23. Jimeno S, Rondón AG, Luna R, **Aguilera A. 2002.** The yeast THO complex and mRNA export factors link RNA metabolism with transcription and genome instability. **EMBO J.** 21(13):3526-35.
24. Chávez S, Beilharz T, Rondón AG, Erdjument-Bromage H, Tempst P, Svejstrup JQ, Lithgow T, **Aguilera A. 2000.** A protein complex containing Tho2, Hpr1, Mft1 and a novel protein, Thp2, connects transcription elongation with mitotic recombination in *Saccharomyces cerevisiae*. **EMBO J.** 19(21):5824-34.
25. Chávez S, **Aguilera A. 1997.** The yeast HPR1 gene has a functional role in transcriptional elongation that uncovers a novel source of genome instability. **Genes Dev.** 11(24):3459-70.

## 10 SELECTED COLLABORATIVE ORIGINAL PUBLICATIONS

1. Han SS, Wen KK, García-Rubio ML, Wold MS, **Aguilera A**, Niedzwiedz W, Vyas YM. **2022.** WASp modulates RPA function on single-stranded DNA in response to replication stress and DNA damage. **Nat Commun.** 13(1):3743.
2. Dagg RA, Zonderland G, Lombardi EP, Rossetti GG, Groelly FJ, Barroso S, Tacconi EMC, Wright B, Lockstone H, **Aguilera A**, Halazonetis TD, Tarsounas M. **2021.** A transcription-based mechanism for oncogenic  $\beta$ -catenin-induced lethality in BRCA1/2-deficient cells. **Nat Commun.** 12(1):4919.
3. Kosar M, Giannattasio M, Piccini D, Maya-Mendoza A, García-Benítez F, Bartkova J, Barroso SI, Gaillard H, Martini E, Restuccia U, Ramirez-Otero MA, Garre M, Verga E, Andújar-Sánchez M, Maynard S, Hodny Z, Costanzo V, Kumar A, Bachi A, **Aguilera A**, Bartek J, Foiani M. **2021.** The human nucleoporin Tpr protects cells from RNA-mediated replication stress. **Nat Commun.** 12(1):3937.
4. Zatreanu D, Han Z, Mitter R, Tumini E, Williams H, Gregersen L, Dirac-Svejstrup AB, Roma S, Stewart A, **Aguilera A**, Svejstrup JQ. **2019.** Elongation Factor TFIIS Prevents Transcription Stress and R-Loop Accumulation to Maintain Genome Stability. **Mol Cell.** 76(1):57-69.e9.
5. Duch A, Canal B, Barroso SI, García-Rubio M, Seisenbacher G, **Aguilera A**, de Nadal E, Posas F. **2018.** Multiple signaling kinases target Mrc1 to prevent genomic instability triggered by transcription-replication conflicts. **Nat Commun.** 9(1):379.
6. Hohl M, Kochańczyk T, Tous C, **Aguilera A**, Krężel A, Petrini JH. **2015.** Interdependence of the rad50 hook and globular domain functions. **Mol Cell.** 57(3):479-91.
7. Duch A, Felipe-Abrio I, Barroso S, Yaakov G, García-Rubio M, **Aguilera A**, de Nadal E, Posas F. **2013.** Coordinated control of replication and transcription by a SAPK protects genomic integrity. **Nature** 493(7430):116-9.
8. Hohl M, Kwon Y, Galván SM, Xue X, Tous C, **Aguilera A**, Sung P, Petrini JH. **2011.** The Rad50 coiled-coil domain is indispensable for Mre11 complex functions. **Nat Struct Mol Biol.** 18(10):1124-31.
9. Bermejo R, Capra T, Jossen R, Colosio A, Frattini C, Carotenuto W, Cocito A, Doksani Y, Klein H, Gómez-González B, **Aguilera A**, Katou Y, Shirahige K, Foiani M. **2011.** The replication checkpoint protects fork stability by releasing transcribed genes from nuclear pores. **Cell** 146(2):233-46.
10. Huertas P, Cortés-Ledesma F, Sartori AA, **Aguilera A**, Jackson SP. **2008.** CDK targets Sae2 to control DNA-end resection and homologous recombination. **Nature** 455(7213):689-92.
11. Strässer K, Masuda S, Mason P, Pfannstiel J, Oppizzi M, Rodríguez-Navarro S, Rondón AG, **Aguilera A**, Struhl K, Reed R, Hurt E. **2002.** TREX is a conserved complex coupling transcription with messenger RNA export. **Nature.** 417(6886):304-8.

## 10 SELECTED INVITED REVIEWS

1. García-Muse T, **Aguilera A. 2019.** R Loops: From Physiological to Pathological Roles. **Cell** 179:604-18
2. Gómez-González B, **Aguilera A. 2019.** Transcription-mediated replication hindrance: a major driver of genome instability. **Genes Dev.** 33(15-16):1008-1026.
3. Gaillard H, **Aguilera A. 2016.** Transcription as a Threat to Genome Integrity. **Annu Rev Biochem** 85:291-317
4. García-Muse T, **Aguilera A. 2016.** Transcription-replication conflicts: how they occur and how they are resolved. **Nat Rev Mol Cell Biol** 17:553-63
5. Gaillard H, García-Muse T, **Aguilera A. 2015.** Replication stress and cancer. **Nat Rev Cancer** 15:276-89
6. Santos-Pereira JM, **Aguilera A. 2015.** R loops: new modulators of genome dynamics and function. **Nat Rev Genet.** 16(10):583-97
7. **Aguilera A**, García-Muse T. **2013.** Causes of genome instability. **Annu Rev Genet** 47:1-32
8. **Aguilera A**, García-Muse T. **2012.** R loops: from transcription byproducts to threats to genome stability. **Mol Cell** 46:115-24
9. **Aguilera A**, Gómez-González B. **2008.** Genome instability: a mechanistic view of its causes and consequences. **Nat Rev Genet.** 9:204-17.
10. **Aguilera A. 2002.** The connection between transcription and genomic instability. **EMBO J** 21(3):195-201.

## SCIENTIFIC INTERVIEW

Cold Spring Harbor Laboratory: <https://www.youtube.com/watch?v=XKz0U2pYQMQ>