

CURRICULUM VITAE (CVA)

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

Part A. PERSONAL INFORMATION

CV date 31/07/2025

First name	Ana		
Family name	Carmena de la Cruz		
Gender (*)		Birth date (dd/mm/yyyy)	
Social Security, Passport, ID number			
e-mail			
Open Researcher and Contributor ID (ORCID) (*)			

(*) Mandatory

A.1. Current position

Position	Principal Investigator/"Investigador Científico CSIC"		
Initial date	01-09-2004/ 16-02-2021		
Institution	Agencia Estatal de Investigación		
Department/Center	Developmental Neurobiology	Instituto de Neurociencias CSIC/UMH	
Country	Spain	Teleph. number	
Key words	Asymmetric cell division; neural stem cell; tumorigenesis; tumor suppressor genes; cell competition; <i>Drosophila</i>		

A.2. Previous positions (research activity interruptions, art. 14.2.b)

Period	Position/Institution/Country/Interruption cause
Jul 2008-Feb 2021	Científico Titular CSIC/IN, CSIC-UMH, Spain
Sep 2004-Jul 2008	Principal Investigator "Ramón y Cajal"/IN, CSIC-UMH, Spain
Oct 1998-Ag 2004	Postdoctoral Researcher/Sloan-Kettering Institute (MSKCC), USA

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD in Biological Sciences	Autónoma de Madrid (UAM)/Spain	1997
Licensed in Biological Sciences	Autónoma de Madrid (UAM)/Spain	1992

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

Main scientific achievements: Predoctoral period: (1) We found, in collaboration with Dr. M. Bate, the existence of *Drosophila* muscle founder cells, which we observed are specified as daughter cell siblings result of muscle progenitor division. We found that these progenitors, in turn, are singled out from groups of equipotent mesodermal cells that express the proneural gene *lethal of scute*, in a process very reminiscent to the neuroblast singling out in the CNS. (2) We showed, in collaboration with Dr. W. Chia, that muscle/heart progenitors divide asymmetrically. (3) We showed, in collaboration with Dr. A.

Michelson, that muscle progenitors are specified by the combinatorial and concerted action of Wingless, Dpp, Ras and Notch signaling pathways. **Postdoctoral period:** (1) We found that Ras response specificity is determined through transcriptional convergence, in the *even-skipped* enhancer, of both transcription factors tissue-specific and transcription factors activated by other signaling pathways. (2) We showed that multiple interactions, competitive and cooperative, exist between the Ras and Notch signaling pathways during muscle progenitor specification. **PI period:** (1) We found that the PDZ protein Canoe acts as an integrator hub of the signals elicited by Wingless/Wnt, Ras and Notch during muscle progenitor specification. (2) We have contributed to increase our knowledge about the protein network that regulates the process of asymmetric cell division and the molecular mechanisms underlying that process. **Our current research line** is focused on the analysis of neural stem cell asymmetric division both in development and in tumorigenesis, employing as model systems *Drosophila* and human glioblastoma neurosphere cell cultures. We have determined that the combinatorial loss of ACD regulators leads to tumor-like overgrowth. Our results also indicate that human homologs of *Drosophila* ACD regulators can target the stemness of human glioblastoma stem cells. For our research, we use techniques of Genetics, Molecular Biology, Cell Biology, Biochemistry and Proteomics. **International collaborators and communication of results:** Since my scientific period as PI, we have collaborated with recognized researchers, such as J. Knoblich, A. Prokop, N. Sánchez-Soriano and N. Tapon. Over all my period as a PI, our group has actively participated in different international Workshops and Conferences to discuss our research results by presenting posters, giving short- talks, as well as through invited seminars.

Research projects: PI of 10 projects: 1 international (EU), 8 nationals (1 of them an intramural project) and 1 regional (GV), plus 3 regional supplementary aids (GV).

Publications (32): Development (4); Genes Dev (3); Curr Biol (3)); Int J Mol Sci (3); J Cell Biol (2); Dev Biol (2); Small GTPases (2); Neuron (1); Cell (1); J Neurosci (1); J Cell Sci (1); Landes Bioscience (1); PLoS ONE (1); Mech Dev (1); WIREs Dev Biol (1); Fly (1); Cell Cycle (1); Bio-Protocols (1); iScience (1); eLife (1). **Reviewer in different journals:** Development; PloS Genetics; Open Biology; Cell Reports; Cell Cycle; Nature Communications; Frontiers in Cell and Developmental Biology, etc.

Thesis and scientific works supervised: 5 PhD works (plus 2 in progress), students currently occupying positions of Senior Investigators abroad, or in biotech companies; 1 JAE fellowship student; 3 Erasmus students; 3 graduate works (TFGs); 7 Master works (TFMs), and 8 curricular or extracurricular practices.

Teaching and Divuligation: **Teaching:** Professor in the annual “Master in Neurosciences”, organized at the IN, in the courses (1) “Genetic analysis” and (2) “Neurogenesis” (Coordinator of the course). Occasional participation in other courses and Master Programs. Participation in 12 Thesis Committees. **Divuligation:** Talks to non-specialized audience and publications of articles in newspapers.

Other merits: **1990:** Scholarship at UAM; **1992:** CSIC predoctoral fellowship; **1992:** MEC predoctoral fellowship; **1998** “EMBO Postdoctoral Fellow; **2000** “Human Frontier SPO Postdoctoral Fellow”; **2003** “Ramón y Cajal Contract”; **2005** “Marie Curie International Reintegration Grant”; **2007** ENI Member (European Neurosciences Institutes) Network as “ENI-NET Young Investigator”; **2008** Position as “Científico Titular of the Spanish Research Council (CSIC)”; **2008** Organization of the international Minisymposium: “*Cell polarity and asymmetric cell division during neurogenesis: From Drosophila to vertebrates*” at the IN (Alicante); **2009** Member of the ANEP Commission; **2011-2017** Member of “TheScientificWorldJOURNAL” Editorial Team; **2012-2014** Member of the “ISRN Developmental Biology” Editorial Team; **2016** Member of the Expert Commission BMC 2016; **2019** Member of the Expert Commission BIO-BMC 2019; Since **2020** until 2025 Review Editor for Signaling in “Frontiers in Cell and Developmental Biology”; Since **2021** Topic Editor in International Journal of Molecular Sciences (MDPI); **2021** “Investigador científico CSIC”. **2021** Organization, coordination and participation in a “Special Issue” of IJMS: “*Molecular Mechanisms of Asymmetric Cell Division in Neural Development and Disease*”. **2023:** Member of “**Conexión Cáncer CSIC**” (<https://conexion-cancer.csic.es/es/bases-geneticas-y-biologicas-de-la-iniciacion-y-la-progresion-tumoral/#ana-carmena>). **2024:** In the Organizing Committee of the European *Drosophila* Research Conference (EDRC) 2025.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications

1. Franco, M., Gargini, R., Barberá, V.M., Saceda, M. and **Carmena, A.** "Human RAP2A Homolog of the *Drosophila* Asymmetric Cell Division Regulator Rap2l Targets the Stemness of Glioblastoma Stem Cells" (2025) *eLife* 14:RP105690. <https://doi.org/10.7554/eLife.105690.1>
2. **Carmena, A.** "Latest News from the "Guardian": p53 Directly Activates Asymmetric Stem Cell Division Regulators" (2025) *International Journal of Molecular Sciences*. 26, 3171 <https://doi.org/10.3390/ijms26073171>
3. Manzanero-Ortiz, S., Franco, M., Laxmeesha, M., and **Carmena, A.** *Drosophila* p53 tumor suppressor directly activates conserved asymmetric stem cell division regulators (2024) *iScience* Oct 9;27(11): 111118. doi: 10.1016/j.isci.2024.111118.
4. De Torres-Jurado, A., Manzanero-Ortiz, S., and **Carmena, A.** Glial-secreted Netrins regulate Robo1/Rac1-Cdc42 signaling threshold levels during *Drosophila* asymmetric neural stem and progenitor cell division (2022) *Current Biology* 32, 1-15; <https://doi.org/10.1016/j.cub.2022.04.001>.
5. Manzanero-Ortiz, S., de Torres-Jurado, A., Hernández-Rojas, R. and **Carmena, A.** "Pilot RNAi Screen in *Drosophila* Neural Stem Cell Lineages to Identify Novel Tumor Suppressor Genes Involved in Asymmetric Cell Division" (2021). *International Journal of Molecular Sciences* 22(21), 11332; <https://doi.org/10.3390/ijms222111332>
6. **Carmena, A.** "The Case of the Scribble Polarity Module in Asymmetric Neuroblast Division in Development and Tumorigenesis" (2020). *International Journal of Molecular Sciences* 21(8), 2865 doi: 10.3390/ijms21082865.
7. **Carmena, A.** "Non-muscle myosin II activation: adding a classical touch to ROCK" (2019). *Small GTPases* DOI: 10.1080/21541248.2019.1671148
8. Franco M. and **Carmena, A.** "Measurement of Mitotic Spindle Angle and Mitotic Cell Distance in Fixed Tissue of *Drosophila* Larval Brains" (2019). *BioProtocols*. 20; 9 (22): e3432; doi: 10.21769/BioProtoc.3432.
9. Franco M. and **Carmena, A.** "Eph signaling in mitotic spindle orientation: what's your angle here?" (2019). *Cell Cycle*, 18:20, 2590-2597. doi:10.1080/15384101.2019.1658479
10. Franco M. and **Carmena, A.** "Eph signaling controls mitotic spindle orientation and cell proliferation in neuroepithelial cells" (2019). *Journal of Cell Biology* Apr 1;218(4):1200-1217. doi: 10.1083/jcb.201807157. Epub 2019 Feb 26
11. **Carmena, A.** "Compromising asymmetric stem cell division in *Drosophila* central brain: revisiting the connections with tumorigenesis" (2018). *Fly* (Austin) 12 71-80.
12. Rives-Quinto, N., Franco, M., de Torres-Jurado A., and **Carmena, A.** "Synergism between *canoe* and *scribble* mutations causes tumor-like overgrowth via Ras activation in neural stem cells and epithelia" (2017). *Development* 144 2570-2583.
13. Keder, A., Rives-Quinto, N., Aerne, B., Franco, M., Tapon, N. and **Carmena, A.** "The Hippo Pathway Core Cassette Regulates Asymmetric Cell Division" (2015). *Current Biology* 25 2739-2750.
14. Pérez-Gómez, R., Slováková, J., Rives-Quinto, N., Krejci, A., and **Carmena, A.** "A Serrate-Notch-Canoe complex mediates essential interactions between glia and neuroepithelial cells during *Drosophila* optic lobe development" (2013). *J Cell Sci*, 126 4873-4884 DOI: 10.1242/jcs.125617.
15. Keder, A. **Carmena, A.** "Cytoplasmic protein motility and polarized sorting during asymmetric cell division" (2013). *WIREs Developmental Biology*. Doi: 10.1002/wdev.116
16. Slováková, J., Speicher, S., Sánchez-Soriano, N., Prokop, A. and **Carmena, A.** "The Actin-Binding Protein Canoe/AF-6 Forms a Complex with Robo and Is Required for Slit-Robo Signaling during Axon Pathfinding at the CNS Midline" (2012). *The Journal of Neuroscience* 32, 10035-10044.
17. **Carmena, A.** "A big new job for small GTPases" (2012). *Small GTPases* 3:3, 1-4.
18. **Carmena, A.***, Makarova, A. and Speicher, S. "The Rap1-Rgl-Ral signaling network regulates neuroblast cortical polarity and spindle orientation" (2011). *The Journal of Cell Biology* 195, 553-562 (*corresponding author).
19. Slováková, J. and **Carmena, A.** "Canoe/AF-6 functions at the CNS midline glia in a complex with Shotgun and Wrapper-Nrx-IV during neuron-glia interactions" (2011). *Development* 138, 1563-1571.
20. **Carmena, A.** "Approaching *Drosophila* development through proteomic tools and databases: At the hub of the post-genomic era" (2009). *Mechanisms of Development* 126, 761-770.
21. **Carmena, A.** "Signaling networks during development: the case of asymmetric cell division in the *Drosophila* nervous system" (2008). *Developmental Biology* 321, 1-17.
22. Speicher, S., Fischer, A., Knoblich, J and **Carmena, A.** "The PDZ Protein Canoe Regulates the Asymmetric Division of *Drosophila* Neuroblasts and Muscle Progenitors" (2008). *Current Biology* 18, 831-837.
23. **Carmena, A.***, Speicher, S. and Baylies, M.K. "The PDZ protein Canoe/AF-6 Links Ras-MAPK, Notch and Wingless/Wnt Signaling Pathways by Directly Interacting with Ras, Notch and Dishevelled" (2006). *PLoS ONE*

1(1): e66. doi: 10.1371/journal.pone.0000066 (*corresponding author).

- 24. Carmena, A.** and Baylies, M.K. "Development of the Larval Somatic Musculature" In "Muscle Development in *Drosophila*" (2006) Landes Bioscience. H. Sink editor.
- 25. Carmena, A.,** Buff, E., Halfon, M.S., Gisselbrecht, S., Jiménez, F., Baylies, M.K., and Michelson, A.M. "Reciprocal regulatory interactions between the Notch and Ras signaling pathways in the *Drosophila* embryonic mesoderm" (2002). **Developmental Biology** 244, 226-242.
- 26. Halfon, M.S., Carmena, A.,** Gisselbrecht, S., Sackerson, C.M., Jiménez, F., Baylies, M.K. and. Michelson, A.M. "Ras pathway specificity is determined by the integration of multiple signal-activated and tissue-restricted transcription factors" (2000). **Cell** 103, 63-74.
- 27. Carmena, A.,** Gisselbrecht, S., Harrison, J., Jiménez, F. and Michelson, A.M. "Combinatorial Signalling Codes for the Progressive Determination of Cell Fates in the *Drosophila* Embryonic Mesoderm" (1998). **Genes & Development** 12, 3910-3922.
- 28. Buff, E., Carmena, A.,** Gisselbrecht, S., Jiménez, F. and Michelson, A.M. "Signaling by the *Drosophila* Epidermal Growth Factor Receptor is Required for the Specification and Diversification of Embryonic Muscle Progenitors" (1998). **Development** 125, 2075-2078.
- 29. Speicher, S.,** García-Alonso, L., **Carmena, A.,** Martín-Bermudo, M.D., de la Escalera S., Jiménez F. "Neurotactin Functions in Concert with Other Identified CAMs in Growth Cone Guidance in *Drosophila*" (1998). **Neuron** 20, 221-233.
- 30. Carmena, A.,** Murugasu-Oei, B., Menon, D., Jiménez, F. and Chia, W. "*inscuteable* and *numb* mediate asymmetric muscle progenitor cell divisions during *Drosophila* myogenesis" (1998). **Genes & Development** 12, 304-315.
- 31. Carmena, A.,** Bate, M. and Jiménez, F. "*lethal of scute*, a proneural gene, participates in the specification of muscle progenitors during *Drosophila* embryogenesis" (1995). **Genes & Development** 9, 2373-2383.
- 32. Martín-Bermudo, M.D.*, Carmena, A.*** and Jiménez, F. "Neurogenic genes control gene expression at the transcriptional level in early neurogenesis and in mesoderm specification" (1995). **Development** 121, 219-224 (*coauthors).

C.3. Research projects (selected)

Title: " Asymmetric Cell Division in Nervous System Development and Tumorigenesis: Redundancy and Cell Competition"; **MICIN/ Ref. PID2024-157539NB-I00; Sep-2025-Aug-2028; 202.500 Euros; IP: A. Carmena**

Title: "Developmental Programs and Functional Impact of Neuron-Astrocyte Interactions in Sensory Circuit Formation and Behavior"; **Generalitat Valenciana (GV) CIPROM/2024/052 2024; 2025-2029 IP: G. López-Bendito.** (granted).

Title: "Asymmetric Cell Division and Cell Competition in Nervous System Development and Tumorigenesis"; **MICIN/ Ref. PID2021-123196NB-I00; Sep-2022-Aug-2025; 199.650 Euros; IP: A. Carmena.**

Title: "Revealing early circuits dynamics in the developing and sensory injured brain"; **GV Prometeo/2021/052; 2021-2024; 474.379,5 Euros; IP: G. López-Bendito.**

Title: "Asymmetric cell division in development and tumorigenesis"; **MICIU/ Ref. PGC2018-097093-B-I00; Jan-2019-Dec-2021 (extended until Sep-2022); 148.225 Euros; IP: A. Carmena**

Title: "Reprogramación de células talámicas para el restablecimiento de circuitos sensoriales"; **GV Prometeo/2017/149; 2017-2021; 390.359 Euros; IP: G. López-Bendito.**

Title: "Analysis of signaling networks that regulate asymmetric cell division in development and disease"; **MINECO/Ref.BFU2015-64251-P; Jan-2016/Aug-2019; 237.160 Euros; IP: A. Carmena**

Title: "The PDZ protein Canoe/AF-6 as a key hub of integration within signaling networks during asymmetric cell division: getting Deep insight into the mechanisms"; **MINECO/Ref. BFU2012-33020; Jan-2013-Dec-2015; 149.760 Euros; IP: A. Carmena**

Title: "Towards the functional interactome around the PDZ protein Canoe/AF-6 during the development of the nervous system"; **MICINN/Ref. BFU2009-08833/BMC; Jan-2010-Dec-2012; 181.500 Euros; IP: A. Carmena.**

Title: "Analysis of PDZ proteins and Signaling Networks during the generation of neuronal identities"; **MEC/ Ref. BFU2006-09130/BMC; Oct-2006-Sep-2009; 121.000 Euros; IP: A. Carmena.**

Title: "Analysis of Signaling Networks during the generation of unique cell fates in animal development"; **UE/ Marie Curie IRG-016536; Oct-2005-Sep-2007; 80.000 Euros; IP: A. Carmena**

Title: "Analysis of PDZ proteins and signaling networks during the generation of cellular identities in the development of the nervous system"; **Generalitat Valenciana/ GV05/075; Jan-2005-Dec-2006; 30.000 Euros; IP: A. Carmena.**