

**CV Date**

11/12/2025

**Part A. PERSONAL INFORMATION**

|                                            |                                             |               |            |
|--------------------------------------------|---------------------------------------------|---------------|------------|
| First Name                                 | Alejo Ezequiel                              |               |            |
| Family Name                                | Rodriguez Fraticelli                        |               |            |
| Sex                                        | Male                                        | Date of Birth | 28/04/1985 |
| ID number Social Security, Passport        | 50773574Q                                   |               |            |
| URL Web                                    | www.fraticellilab.com                       |               |            |
| Email Address                              | alejo.rodriguez-fraticelli@irbbarcelona.org |               |            |
| Open Researcher and Contributor ID (ORCID) | 0000-0002-4017-8714                         |               |            |

**A.1. Current position**

|                     |                                                                     |              |  |
|---------------------|---------------------------------------------------------------------|--------------|--|
| Job Title           | RESEARCH PROFESSOR                                                  |              |  |
| Starting date       | 2023                                                                |              |  |
| Institution         | Institució Catalana de Recerca i Estudis Avancats                   |              |  |
| Department / Centre | AGING AND METABOLISM PROGRAMME / IRB BARCELONA                      |              |  |
| Country             |                                                                     | Phone Number |  |
| Keywords            | Molecular mechanism of disease; Developmental biology; Cell biology |              |  |

**A.2. Previous positions (Research Career breaks included)**

| Period      | Job Title / Name of Employer / Country                            |
|-------------|-------------------------------------------------------------------|
| 2020 - 2021 | INSTRUCTOR / HARVARD MEDICAL SCHOOL                               |
| 2015 - 2019 | RESEARCH FELLOW / BOSTON CHILDREN'S HOSPITAL                      |
| 2014 - 2014 | DOCTOR / Consejo Superior de Investigaciones Científicas          |
| 2009 - 2014 | JAE PREDOCTORAL / Consejo Superior de Investigaciones Científicas |

**A.3. Education**

| Degree/Master/PhD                                         | University / Country           | Year |
|-----------------------------------------------------------|--------------------------------|------|
| Programa en Bioquímica, Biomedicina y Biología Molecular  | Universidad Autónoma de Madrid | 2014 |
| Licenciado en Ciencias Biológicas Especialidad Bioquímica | Universidad Autónoma de Madrid | 2008 |

**Part B. CV SUMMARY**

The overarching theme of my research career is **how regenerating tissues co-opt developmental programs to coordinate and modulate the balance between cell division, cell death and cell differentiation**. In my graduate studies, I centered my attention on epithelial development, and worked in the labs of Dr. Miguel Angel Alonso and Dr. Fernando Martin-Belmonte to unveil novel regulators of epithelial morphogenesis, resulting in 4 (co)-first author papers in **Nature Cell Biology** and **Journal of Cell Biology**.

For my postdoctoral training, I decided to study how blood stem cells balance the large daily demand for all the different functional cells they provide to different organs. At Harvard, I worked with Dr. Fernando Camargo and Dr. Allon Klein, and I set to figure out the complexity of lineage choices in blood regeneration using systems biology approaches (single cell clonal tracing and single cell RNA sequencing).

I received independent support from the **Life Sciences Research Foundation MERCK Fellowship**, published our findings in a landmark study in **Nature**, which was highly acclaimed in the blood stem cell community, with over 600 citations. In 2018, I obtained additional funding

to help me transition to an independent position, including from the **American Society of Hematology (Scholar Award)**, **The Leukemia and Lymphoma Society (Special Fellow Award)**, and the **National Heart Lung and Blood Institute (K99/R00)**, with over \$1.5M in **total funds**, leading to my appointment as non-faculty instructor .

As a senior fellow at Harvard Medical School, I was able to lead and complete two additional projects as first author (published in **Nature and Science**), which have revolutionized how we understand the regulation of clonal cell behaviors, with over 600 citations since 2020.

In 2021, I started my first independent group as the director of the laboratory of Quantitative Stem Cell Dynamics at the **Institute of Research in Biomedicine in Barcelona (IRB Barcelona)**, and since 2023, I am also a research professor at **ICREA**. In my independent group, we aim to tackle the following questions: Can we predict which cells will contribute to a tissue during development, which cells will age faster, and which have increased potential to grow and create a tumor? And, if cell responses and behaviors can be highly predictable, then how can we use single cell sequencing analysis to improve therapies? To answer these questions, I lead a multidisciplinary research program, formed by a talented group of researchers with expertise in genomics, cell biology, computational biology and statistics.

To do this, we have obtained top local and international funding, including the **ERC Starting Grant** and the **Cris Foundation Excellence Grant**, and highly competitive collaboration grants, such as the **CaixaResearch Health 2023**. I have also obtained independent recognition through the **ASEICA Basic Cancer Research Junior Award**, and, more recently, through the **EMBO YIP Award**.

As a group leader, we have so far published our research results in **Nature**, **Cell Stem Cell**, and **Nature Cell Biology** with various other manuscripts in submission.

Summary of major scientific contributions:

- 1. Identification of clonal fate heterogeneity in hematopoietic stem cells using single-cell lineage tracing** (Nature 2025, DOI: 10.1038/s41586-025-09041-8; Nature 2020, DOI: 10.1038/s41586-020-2503-6; Nature 2018, DOI: 10.1038/nature25168).
- 2. Development of methodologies to link transcriptional states with future cell fate decisions** (Science 2020, DOI: 10.1126/science.aaw3381; Cell Stem Cell 2020, DOI: 10.1016/j.stem.2019.12.009).
- 3. Identification of stem cell heterogeneity as a determinant of clonal responses to cancer driver mutations** (Cell Stem Cell 2025 , DOI: 10.1016/j.stem.2025.01.012).
- 4. Our lineage tracing tools and datasets** have been deposited, shared, used, and re-used in hundreds of labs around the world, including in leading institutions studying cancer, stem-cell, and developmental biology.

My leadership in the stem cell and cancer field has been recognized through multiple invitations to prestigious international scientific meetings and over a dozen lectures at top institutes.

I am also a frequently invited **peer-reviewer** of manuscripts for the most prestigious journals (**Cell**, **Cell Stem Cell**, **Cell Reports**, **Cell Systems**, **Nature**, **Nature Medicine**, **Nature Biotechnology**, **Nature Cell Biology**, **Nature Protocols**, **Nature Communications**, **Science**, **Blood**, **Development**, **Stem Cells**, **ATVB**) and grants ( **ERC**, **EHA**, **AEI**, **ANR**). I have been invited to write several important reviews (for Nature Reviews Genetics, and Blood).

I have also independently secured funding from EMBO and **co-organized the first EMBO workshop on Single-cell Lineage Tracing** (Girona, 2025). I have also co-organized the BBVA-IRB BioMed conference (Barcelona 2022), the ISCO meeting (Barcelona 2022, 2024) and the EDBC Barcelona satellite symposium 2024.

## Part C. RELEVANT ACCOMPLISHMENTS

### C.1. Most important publications in national or international peer-reviewed journals, books and conferences

AC: corresponding author. (nº x / nº y): position / total authors. If applicable, indicate the number of citations

- 1 **Scientific paper.** (1/4) Weinreb\*, CS; Rodriguez-Fraticelli\*, AE; Camargo, FD; Klein, AM. 2020. Lineage tracing on transcriptional landscapes links state to fate during differentiation. *Science*. WOS (11), Google Scholar (24)
- 2 **Scientific paper.** (1/9) Rodriguez-Fraticelli, AE; Weinreb, CS; Wang, SW; et al; Klein, AM. 2020. Single cell lineage tracing unveils role for Tcf15 in haematopoiesis. *Nature*.
- 3 **Scientific paper.** (1/10) Rodriguez-Fraticelli, AE; Wolock, SL; Weinreb, CS; et al; Camargo, FD. 2018. Clonal analysis of lineage fate in native haematopoiesis. *Nature*. WOS (101), Google Scholar (149) <https://doi.org/10.1038/nature25168>
- 4 **Scientific paper.** (1/13) Rodriguez-Fraticelli, AE; Bagwell, J; Bosch-Fortea, M; et al; Martin-Belmonte, F. 2015. Developmental regulation of apical endocytosis controls epithelial patterning in vertebrate tubular organs. *Nature Cell Biology*. WOS (29), Google Scholar (37) <https://doi.org/10.1038/ncb3106>
- 5 **Scientific paper.** (1/15) Galvez-Santisteban, M; Rodriguez-Fraticelli, AE; Bryant, DM; et al; Martin-Belmonte, F. 2012. Synaptotagmin-like proteins control the formation of a single apical membrane domain in epithelial cells. *Nature Cell Biology*. WOS (70), Google Scholar (107) <https://doi.org/10.1038/ncb2541>
- 6 **Scientific paper.** WC Yuan; AS Earl; S Ma; et al; FD Camargo; (11/16) Q Zhu. 2025. HBO1 functions as an epigenetic barrier to hepatocyte plasticity and reprogramming during liver injury. *Cell Stem Cell*. Cell Press. 32-6, pp.990-1005. <https://doi.org/10.1016/j.stem.2025.04.010>
- 7 **Scientific paper.** M Scherer; I Singh; MM Braun; et al; L Velten. 2025. Clonal tracing with somatic epimutations reveals dynamics of blood ageing. *Nature*. Springer Nature. online, pp.online. <https://doi.org/10.1038/s41586-025-09041-8>
- 8 **Scientific paper.** I Singh; D Fernandez-Perez; PS Sanchez; AE Rodriguez-Fraticelli. 2025. Pre-existing stem cell heterogeneity dictates clonal responses to the acquisition of leukemic driver mutations. *Cell Stem Cell*. Cell Press. 4-32, pp.564-580. <https://doi.org/10.1016/j.stem.2025.01.012>
- 9 **Scientific paper.** J Rettkowski; MC Romero-Mulero; I Singh; et al; N Cabezas-Wallscheid; (32/34) AE Rodriguez-Fraticelli. 2025. Modulation of bone marrow haematopoietic stem cell activity as a therapeutic strategy after myocardial infarction: a preclinical study. *Nature Cell Biology*. Springer Nature. 27-4, pp.591-604. <https://doi.org/10.1038/s41556-025-01639-4>
- 10 **Scientific paper.** Kyung Mok Kim; Anna Mura-Meszaros; Marie Tollot; et al; Bjorn von Eyss. 2022. Taz protects hematopoietic stem cells from an aging-dependent decrease in PU.1 activity. *Nature Communications*. Springer Nature. 13-5187.
- 11 **Scientific paper.** Mariam Hachimi; Catalina Grabowski; Silvia Campanario; et al; Fernando Martin Belmonte; (12/13) Alejo Rodriguez Fraticelli (AC). 2021. Smoothelin-like 2 inhibits Coronin-1B to stabilize the apical actin cortex during epithelial morphogenesis. *Current Biology*. Elsevier. in press.
- 12 **Scientific paper.** J Agudo; CW Cheng; CL Jones; A Avgustinova; (5/6) AE Rodriguez-Fraticelli; M Storer. 2021. Introductions to the community: Early-career researchers in the time of COVID-19. *Cell Stem Cell*. Elsevier. 28-4, pp.600-602.
- 13 **Scientific paper.** P Sommerkamp; MC Romero-Mulero; A Narr; et al; N Cabezas-Wallscheid; (12/16) A Rodriguez-Fraticelli. 2021. Mouse multipotent progenitor 5 cells are located at the interphase between hematopoietic stem and progenitor cells. *Blood*. ASH. 137-23, pp.3218-3224.

- 14 Scientific paper.** Bowling, S; Sritharan, D; Osorio, FG; et al; Camargo, FD; (5/13) Cheung, P. 2020. An Engineered CRISPR-Cas9 Mouse Line for Simultaneous Readout of Lineage Histories and Gene Expression Profiles in Single Cells. *Cell*. WOS (0), Google Scholar (1) <https://doi.org/10.1016/j.cell.2020.04.048>
- 15 Scientific paper.** Hurley, K; Ding, J; Villacorta-Martin, C; et al; Kotton, DN; (20/23) Rodriguez-Fraticelli, AE. 2020. Reconstructed Single-Cell Fate Trajectories Define Lineage Plasticity Windows during Differentiation of Human PSC-Derived Distal Lung Progenitors. *Cell Stem Cell*. WOS (0), Google Scholar (7) <https://doi.org/10.1016/j.stem.2019.12.009>
- 16 Review.** (1/1) 1 (AC). 2025. Clonal tracing of blood stem cells across mouse and human lifespans. *Blood*. Elsevier.
- 17 Review.** KM Aird; AA Chaudhuri; JL Guerriero; et al; I Yanai. 2024. Reflections on Advances in Cancer Research in 2024. *Cancer Discovery*. AACR. 12-14, pp.2346-2351.
- 18 Review.** 2024. Tumbling bacteria and non-genetic individuality. *Nature Reviews in Genetics*. Springer Nature. 12-25, pp.826.
- 19 Review.** Mackenzie Bloom; Camille Malouf; Alejo Rodriguez Fraticelli; Adam Wilkinson; Vijay Sankaran; Ana Cvejic. 2023. Exploiting somatic mutations to decipher human blood production: a natural lineage-tracing strategy. *Experimental Hematology*. Elsevier.

### C.3. Research projects and contracts

- 1 Project.** PDC2025-166663-I00, A highly-Multiplexed Single-cell Compound perturbation-screening platform to identify epigenetic susceptibilities in Acute myeloid Leukemic stem cells (MuSICAL). Ministerio de Ciencia e Innovación. (FUNDACIO PRIVADA INSTITUT DE RECERCA BIOMEDICA). 01/02/2026-31/01/2028. 221.430 €.
- 2 Project.** 101042992, Origins and Consequences of Stem Cell Memories. European Research Council. Alejo Rodriguez Fraticelli. (FUNDACIO PRIVADA INSTITUT DE RECERCA BIOMEDICA). 01/07/2022-30/06/2027. 1.500.000 €. Principal investigator.
- 3 Project.** Applying DNA and optical barcoding to study endothelial progenitor cells in physiology and disease. Obra Social Fundación la Caixa. Graupera. (FUNDACIO PRIVADA INSTITUT DE RECERCA BIOMEDICA). 01/12/2023-30/11/2026. 999.918 €.
- 4 Project.** PR\_EX\_2020-24, Systems Analysis of Therapy Resistance in Acute Myeloid Leukemia. Fundacion CRIS. Alejo Rodriguez Fraticelli. (FUNDACIO PRIVADA INSTITUT DE RECERCA BIOMEDICA). 01/09/2021-31/08/2026. 1.250.000 €. Principal investigator.
- 5 Project.** Identifying novel extrinsic regulators of blood stem cell heterogeneity. Ministerio de Ciencia e Innovación. Alejo Rodriguez Fraticelli. (FUNDACIO PRIVADA INSTITUT DE RECERCA BIOMEDICA). 01/07/2024-30/06/2026. 165.289 €.
- 6 Project.** Mecanismos moleculares de la resistencia a terapia y plasticidad celular de la leucemia mieloide aguda. Ministerio de Economía y Hacienda. Alejo Rodriguez Fraticelli. (FUNDACIO PRIVADA INSTITUT DE RECERCA BIOMEDICA). 01/09/2021-31/08/2024. 228.690 €.
- 7 Project.** PID2023-148073OB-I00, TRACING HERITABLE STEM CELL STATES IN RESPONSE TO CANCER MUTATIONS. MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES. Alejo Rodriguez Fraticelli. (FUNDACIO PRIVADA INSTITUT DE RECERCA BIOMEDICA). From 01/01/2025. 281.250 €. Co-ordinator.
- 8 Contract.** CD36 in AML therapy response ONA THERAPEUTICS. Luis Rodriguez Escudero. 01/02/2024-01/08/2024. 11.080 €.

### C.4. Activities of technology / knowledge transfer and results exploitation

Joanne Young; Alejo Rodriguez Fraticelli; Fernando Martin Belmonte; Michel Bornens; Muriel Auzan. WO2013014164A1. Methods and a device for the formation of three-dimensional multicellular assemblies 31/01/2013. CYTOO and Consejo Superior de Investigaciones Científicas. CYTOO.