3.3.9 MicroRNA Regulation of Immune Tolerance, Autoimmunity and Cancer

COMPOSITION

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STRATEGIC OBJETIVES

- Our laboratory investigates the role of microRNAs (miRNAs) in immune regulation, with a particular focus on immune tolerance, autoimmune diseases, and cancer. We previously identified miR-148a and the miR-17~92 cluster as essential regulators of B cell tolerance, demonstrated a causal role of miR-148a in the development of lethal autoimmunity, and elucidated the molecular mechanisms through which these miRNAs exert their effects. Overall, our findings have established miRNAs as critical regulators of B cell tolerance and autoimmunity.
- Current research in the lab continues to identify and study the roles of miRNAs and their target genes in immune tolerance, autoimmunity and tumor immunology by combining genetic, genomic, biochemical, and functional screening approaches to understand the functions and molecular mechanisms of miRNA control at molecular, cellular, and system levels. This research may lead to the identification of new therapeutic targets for the treatment of autoimmune diseases and for cancer immunotherapy.

RESEARCH LINES

- 1. Identify novel regulators of B cell tolerance and T cell responses in autoimmunity and cancer.
- 2. Establish the cellular and molecular mechanisms underlying their regulatory function.
- 3. Determine the contribution of these regulators to the development and progression of autoimmune diseases and cancer.

RESEARCH ACTIVITY

Doctoral Theses

- **González Molina MP.** Deciphering the role of microRNAs in tumor immunology[dissertation]. Madrid: Universidad Autónoma de Madrid: 2024(02/12/2024). Director: González Martín A.
- **Bartolomé Cabrero R.** MiR-148a shapes brain development and function through regulating neurite growth and polarization [dissertation]. Madrid: Universidad Autónoma de Madrid: 2024(16/12/2024). Director: González Martín A, Gascón Jiménez S

Master Theses

- **Arsic N.** Identification of novel regulators of B cell tolerance[dissertation]. Madrid: Universidad Autónoma de Madrid, Universidad de Barcelona, Universidad de Amberes , Universidad Claude Bernard Lyon; Universidad Jean Monnet: 2024(19/07/2024). Director: González Martín A

Final Degree Theses

- **Gonzalo Santana T.** Functional analysis of microRNAs and its target genes in B cell tolerance[dissertation]. Madrid: Universidad Autónoma de Madrid: 2024(05/06/2024). Director: González Martín A

Research projects

- **González Martín A.** Systematic analysis of tumor-specific B cell immunity (CNS2022-136069). Agencia Estatal de Investigación. 2023-2025. Managment centre: UAM
- **González Martín A.** Harnessing microRNAs for improved lung cancer immunotherapies. Fundación Ramón Areces. 2023-2026. Managment centre: UAM
- **González Martín A.** MicroRNA regulatory networks in B cell tolerance and autoimmunity (PID2021-128244OB-I00). Agencia Estatal de Investigación. 2022-2026. Managment centre: UAM
- **González Martín A.** Harnessing microRNAs for improved lung cancer immunotherapies. Fundación FERO. 2023-2026. Managment centre: UAM
- **González Martín A.** B cell engineering in murine and human primary B cells (OPP11839562019). Bill and Melinda Gates Foundation. 2019-2025. Managment centre: UAM
- **González Martín A.** Identifying novel targets for cancer immunotherapy (LABAE20001GONZ). Asociación Española Contra el Cáncer. 2020-2024. Managment centre: UAM

Patents and trademarks

- **Voss J, Huang D, Gonzalez-Martin A, Andrabi R, Burton D, inventors; The Srcipps Research Institute, assignees.** B Cell receptor modification in B cells. WO2019028417A1-PCT/US/45255. 2018 August 3
- **Gonzalez-Martin A, Gonzalez-Molina MdP.** MicroRNAs for use in the stimulation of T-cell anti- tumor response. PCT/EP2024/064900. 2024 September 20