



CURRICULUM VITAE (CVA)

Part A. PERSONAL INFORMATION

		CV date	04/10/2022
First name	David		
Family name	Sancho Madrid	ID number	22989193A
Gender	Male	Date of Birth	22/03/1972
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ORCID code	http://orcid.org/0000-0003-2890-3984		

A.1. Current position

Position	Full Professor		
Initial date	20/12/2021		
Institution	Centro Nacional de Investigaciones Cardiovasculares (CNIC)		
Department/Centre	Immunobiology lab		
Country	Spain	Phone number	679421936
Keywords	Dendritic cells, macrophages, immunometabolism, trained immunity, microbiota.		

A.2. Previous positions (research activity interruptions)

Period	Position/Institution/Country
Oct 2016-Dic 2021	Associate Professor, CNIC, Madrid
Sep 2009-Sep 2016	Assistant Professor and RYC fellow, CNIC, Madrid
Sep 2004-Aug 2009	Postdoc fellow London Research Institute CRUK. Marie Curie and EMBO fellow, UK
Nov 2001-Aug 2004	Research fellowship ISCIII (BEFI), Hospital de La Princesa, Madrid
May 2000-Oct 2001	Severo Ochoa fellowship from Ferrer Foundation, Hospital de la Princesa, Madrid
Apr 1996-Apr 2000	Specialization in Immunology via B.I.R. (Internship) Hospital de la Princesa, Madrid

A.3. Education

PhD, Graduate Degree	University/Country	Year
BSc Degree in Biology, National Prize	School of Biology, Universidad de Murcia, Spain	1995
Clinical Specialization in Immunology	Immunology Service, La Princesa Hospital	2000
PhD degree in Sciences, Extr. prize	Universidad Autónoma de Madrid, Spain	2003

Part B. CV SUMMARY (main author in quoted papers)

I performed my clinical specialization in Immunology (1996-2000) and my PhD (2000-2003) in La Princesa Hospital/UAM. I took a postdoctoral position at the London Research Institute (Cancer Research UK, 2004-2009) where I found a new C-type lectin (DNGR-1/CLEC9A) that selectively marks the population of human and mouse dendritic cells (DCs) that cross-present antigens in MHC-I, using this selective expression to target DCs for tumor immunotherapy (*JCI*, 2008). Our work additionally established the function of DNGR-1/CLEC9A in cross-priming in vivo (*Nature*, 2009).

On my return to Spain, I established my independent laboratory at CNIC (2010). At the Immunobiology lab funded by continuous support from Plan Estatal since 2010 and also with the **ERC Starting Grant (2010-2016)**, we found that cross-presentation via DNGR-1 facilitates CD8+ T cell responses to cytopathic viruses (*JCI* 2012) and greatly contributes to priming of precursors of resident memory CD8+ T cell (T_{rm}) precursors (*Immunity*, 2016a), key cells that can contribute to anti-tumor immunity (*Nat. Commun.* 2017). Notably, DNGR-1 is a C-type lectin receptor (CLR) with an activating motif that couples to non-receptor tyrosine kinase activation but we found that it can also activate tyrosine phosphatases and inhibit inflammation driven by tissue damage (*Science* 2018). My lab established the concept of C-type lectin receptors signalling dually via kinases and phosphatases and showed that this can impact the outcome of infection (*J. Immunol.* 2015; *Immunity*, 2016b; *Cell Reports* 2018a). Moreover, we investigated the function of CLRs in sensing microbiota and keeping gut immune barrier (*Immunity*, 2019). We also advanced our understanding of the relevance and function of cDC1s in pathologies like Leishmania infection (*Eur. J. Immunol.* 2015), asthma (*JCI insight* 2017), obesity (*Cell. Mol. Immunol.* 2022) and cancer immunotherapy (*Cancer Discov.* 2016; *JITC* 2019, *Nat. Rev. Immunol.* 2020; *JITC* 2021).

Research in the last years, funded by Plan Estatal and the **ERC Consolidator Grant (2017-2023)** focuses on the induction of trained immunity in innate cells, mainly macrophages and how innate sensing in DCs and macrophages can repurpose mitochondrial metabolism for cytokine production. The results on trained immunity have identified



new pathways and have allowed us to collaborate with Inmunotek S.L. to decipher the mechanisms underlying the efficacy of a polybacterial preparation in protection against heterologous infections in clinical trials. We demonstrated that this preparation can protect against viral infections and increase the immunogenicity of antigen-specific vaccines (*Cell Reports* 2018a; *Cell Reports* 2018b; *Front. Immunol* 2021; *Cell Reports* 2022). Our results in immunometabolism research have established how innate sensing in macrophages can affect mitochondrial complex activity, resulting in enhanced cytokine production and affecting the polarization of macrophages (*Nat Immunol.* 2016; *Nat Metab.* 2020).

I am also active in **technology transfer** (see part C4) with filing of 4 patents, two of them currently active, and **research collaboration agreements with pharmaceutical companies** to develop applied research in the field of trained immunity (Inmunotek S.L.), DC immunotherapy (Adendra Therapeutics; Miltenyi Biotec),

My work has more than 8600 cites (WOS, with more than 84 cites average per main author article, H index=49). I have led highly cited reviews in immunology and immunotherapy (*Cell. Mol. Immunol.* 2021; *Curr. Opin. Immunol.* 2021; *Nat. Rev. Immunol.* 2020; *Annu. Rev. Immunol.* 2012).

Part C. RELEVANT MERITS

C.1. Main Research Publications led by the PI in the last 6 years (max. 10) (*) Senior and corresponding author

1. Brandi P, (...) **Sancho D***. Trained immunity induction by the inactivated mucosal vaccine MV130 protects against experimental viral respiratory infections. *Cell Rep.* 2022 Jan 4;38(1):110184.
2. Hernández-García E, (...) **Sancho D***, Iborra S*. Conventional type 1 dendritic cells protect against age-related adipose tissue dysfunction and obesity. *Cell Mol Immunol.* 2022 Feb;19(2):260-275
3. Cueto FJ, (...) **Sancho D***. DNGR-1 limits Flt3L-mediated antitumor immunity by restraining tumor-infiltrating type I conventional dendritic cells. *J Immunother Cancer.* 2021 May;9(5):e002054.
4. Acín-Pérez R, (...), **Sancho D*** & Enríquez JA*. Fgr kinase is required for proinflammatory macrophage activation during diet-induced obesity. *Nat Metab.* 2020; 2(9):974-988.
5. Wculek, SK (...) **Sancho D***. Effective cancer immunotherapy by natural mouse conventional type-1 dendritic cells bearing dead tumor antigen. *J Immunother Cancer.* 2019.;7(1):100.
6. Martínez-Lopez, M, (...), **Sancho D***. Microbiota sensing by Mincle-Syk axis in DCs regulates IL-17 and IL-22 production and promotes intestinal barrier integrity. *Immunity.* 2019. 50(2):446-461.e9.
7. Del Fresno C, Saz-Leal P, (...), **Sancho D***. DNGR-1 in dendritic cells limits tissue damage by dampening neutrophil recruitment. *Science.* 2018; 362(6412):351-356.
8. Iborra S, (...), **Sancho D***. Optimal generation of tissue-resident but not circulating memory T cells during viral infection requires crosspriming by DNGR-1+ DCs. *Immunity* 45(4) pp. 847-860 (2016).
9. Iborra S, Martínez-López M, (...), **Sancho D***. Leishmania uses Mincle to target an inhibitory ITAM signaling pathway in DCs that dampens adaptive immunity to infection. *Immunity* 45(4) pp. 788-801 (2016).
10. Garaude J, Acín-Pérez R, (...), Enríquez JA* & **Sancho D***. Mitochondrial respiratory-chain adaptations in macrophages contribute to antibacterial host defense. *Nat. Immunol.* 17(9) pp. 1037-45 (2016)

C.2. Main international congresses as invited speaker in the last 3 years (max. 10)

1. Invited speaker "Translational research in cancer immunotherapy" (Madrid, 29, 30 Sep 2022)
2. Invited speaker to Immunometabolism meeting (BSI, Sao Paulo, 20-24 Sep 2022)
3. Keynote speaker at ImmunoMetNet conference (Amsterdam, 11th May 2022)
4. Invited speaker at Keystone conference on myeloid cells (6-9/3/2022, Banff, Canada)
5. Invited speaker at the European Congress of Immunology (1-4/9/2021, virtual format)
6. Invited speaker at Vanderbilt Immunometabolism 2020 symposia (8/5/2020, virtual format)
7. Keynote lecture at Norwegian Society for Immunology Annual meeting (Oslo, 29/11/2019)
8. Irish Society for Immunology Annual meeting (Dublin, 19-20/10/2019)
9. 33rd Meeting of the European Macrophage and Dendritic cell Society (EMDS) (Marseille, 12-14/9/2019)
10. Stony Brook University international symposium in inflammation (New York, 29/4/2019)

C.3. Selected Research projects as PI (max 10)

1. Title: Molecular Regulation of macrophage and dendritic cell function. Participant Institution: Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III. PI: David Sancho. Funding Institution: **Ministerio de Ciencia e Innovación. Agencia Estatal de Investigación. PID2019-108157RB**. From: 01/06/2020 To: 31/05/2023 Total Amount: 435,600€ + 1 pre-doctoral fellowship.
2. Title: Inmunidad Tumoral e Inmunoterapia del Cáncer (IMMUNOTHERCAN-CM); Ref: B2017/BMD-3733. Participant Institution: Consortium with node in the Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III. PI



of the IMMUNOBIOL group at CNIC: David Sancho. Funding Institution: Ayudas para la realización de Programas de Actividades de I+D entre Grupos de Investigación de la Comunidad de Madrid en Tecnologías y en Biomedicina, cofinanciado con Fondos Estructurales. **Comunidad de Madrid**. From: 01/01/2018 To: 31/12/2021 Total Amount for consortium (9 groups): 952.472,28€. Total amount to David Sancho: 93,317€

3. Title: Brain-gut cross-talk in stroke: targeting gut barrier dysfunction and immune responses to improve stroke outcome (Exp: 130/C/2017). Participant Institution: Collaborative project with the Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III. PI CNIC node: David Sancho. Funding Institution: Ayudas a la investigación en ictus y lesiones medulares y cerebrales traumáticas. **Fundación La Marató de TV3**. From: 2018 To: 2021. Total Amount to David Sancho: 86,250 €

4. Title: Caracterización Funcional de la Regulación de la Inmunidad Innata y Adaptativa por las Células Dendríticas. Participant Institution: Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III. PI: David Sancho. Funding Institution: Ministerio de Economía, Industria y Competitividad. **SAF2016-79040-R**. From: 01/12/2016 To: 30/11/2019 Total Amount: 350,900€ + 1 pre-doctoral fellowship.

5. Title: Functional characterisation of mitochondrial metabolic adaptations to innate sensing in dendritic cell subsets. **H2020-ERC-2016-CONSOLIDATOR GRANT** 725091-MITOMAD. Participant Institution: Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III. PI: David Sancho. Funding Institution: European Commission, H2020. From: 01/12/2017 To: 30/11/2022 Total Amount: 1,995,000€

6. Title: "PROCROP-Professional cross-priming for ovary and prostate cancer". H2020 personalising Health and Care (635122-PROCROP H2020). Coordinator: Ignacio Melero (CIMA, Pamplona). Consortium with 7 international Institutions as partners. PI CNIC node: David Sancho. Funding Institution: **EU Framework Programme for Research and Innovation H2020** Date: 01/09/2015 to 28/02/2021. Funding CNIC node: 655.000€.

7. Title: Immunotherapy by targeting dendritic cells with nanoparticles. Participant Institution: Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III. PI: David Sancho. Funding Institution: **Fondation Acteria**. From: 2017 To: 2019 Total amount: 150,000€

8. Title: "Efectos funcionales de la detección de infección y muerte celular por células mieloides". PI: David Sancho. Funding Institution: Ministry of Economy and Competitiveness: **SAF2013-42920-R**. Participant Institution: CNIC. Date: 2014- December 2016. Funding: 278,300 € + 1 predoctoral fellowship.

9. Title: Immune functions of myeloid Syk-coupled C-type lectin receptors sensing necrosis. PI: David Sancho. Funding Institution: European Research Commission. **ERC-2010 StG 260414 Starting Grant**. Participant Institution: CNIC. Date: 12/2010- 08/2016. Funding: 1,297,671.98 €.

10. Title: Immune functions of myeloid Syk-coupled C-type lectin receptors sensing necrosis. PI: David Sancho. Funding Institution: Ministry of Science and Innovation. **SAF2010-15120**. Participant Institution: CNIC. Date: 01/01/2011- 31/12/2013. Funding: 193,600 € + 1 predoctoral fellowship.

C.4. Technology/Knowledge transfer (max 10)

Active patents

1. Title: Enhanced trained immunity in myeloid cells by SHIP-1 inhibition. Inventors: Sancho D, Saz-Leal P, Del Fresno C, Kerr WG, Chisholm JD. Holder entity CNIC, Syracuse University and SUNY Upstate University. Priority number: EP18382404.4. Priority country: EU. Date: 06/06/2018.

2. Title: Immune modulation via C-type lectin. Inventors (in order of contribution): Sancho D, Reis e Sousa C, Joffre OP, Rogers N, Schulz O, Pennington D. Holder Entity: Cancer Research UK. Company licensing: Cancer Research technology limited. PCT/GB2008/002504 Filed on 21/07/2008. Publication n°: WO/2009/013484 (29/01/2009)

Research agreements with companies

1. Title: Targeting conventional dendritic cells (cDCs) as a new therapeutic approach after myocardial infarction. PI: David Sancho. Participant Institutions: Adendra Therapeutics (London, UK) and Centro Nacional de Investigaciones Cardiovasculares Carlos III. Funding Company: Adendra Therapeutics Type of Institution: Business Entity. Duration: Aug2022-Aug2025. Total amount: 130,532€.

2. Title: Evaluating the protection of bacterial preparations in viral infection and improvement of the immunogenicity of vaccines. PI: David Sancho. Participant Institutions: Inmunotek S.L. (Madrid, Spain) and Centro Nacional de Investigaciones Cardiovasculares Carlos III. Funding Company: Inmunotek S.L. Type of Institution: Business Entity. Duration: Jul2022-Jul2024. Total amount: 99,673€.

3. Title: Testing the effect of the inactivated mucosal vaccine MV130 in protection against experimental viral respiratory infections. PI: David Sancho. Participant Institutions: Inmunotek S.L. (Madrid, Spain) and Centro Nacional de Investigaciones Cardiovasculares Carlos III. Funding Company: Inmunotek S.L. Type of Institution: Business Entity. Duration: 2019-2021. Total amount: 41,600€



4. Title: Evaluating the mechanism of protection of bacterial preparations against respiratory viral infections. PI: David Sancho. Participant Institutions: Inmunotek S.L. (Madrid, Spain) and Centro Nacional de Investigaciones Cardiovasculares Carlos III. Funding Company: Inmunotek S.L. Type of Institution: Business Entity. Duration: Sep 2018 to Mar 2019. Total Amount: 19150€

5. Title: Evaluation of the protective effect of bacterial preparations in mouse models of respiratory viral infection and house dust mite-induced asthma. PI: David Sancho. Participant Institutions: Inmunotek S.L. (Madrid, Spain) and Centro Nacional de Investigaciones Cardiovasculares Carlos III. Funding Company: Inmunotek S.L. Type of Institution: Business Entity. Duration: May 2016 to Jan 2017. Total Amount: 15,650.79€

6. Collaboration with Miltenyi Biotec (Bergisch Gladbach, Germany) in the context of the European Consortium PROCROP (2016-2021).

7. Title: Sensing necrosis by C-type lectin receptors in inflammation models in vivo. PI: David Sancho. Funding Institution: Research Cooperation Agreement with Medimmune (Cambridge). Participant Institution: CNIC. Date 2011-2013 (extended until 31/12/2018). Funding: 263,254.71€

C5. Organization of international meetings.

I have **organized international meetings**, including 4 editions of the international symposium Miltenyi inflammation and immunity day (2014, 2016, 2018 & 2022 >140att) & 31st European Macrophage and DC Society. Madrid, September 2017 (>220 att.).

C6. Supervision in research training

- 7 doctoral theses directed: [Francisco Javier Cueto Rodríguez \(14/07/2020\)](#), [Paola Brandi \(08/07/2020\)](#), [María Martínez-López \(22/02/2019\)](#), [Paula Saz-Leal \(14/12/2018\)](#), [Helena M. Izquierdo Fernández \(18/07/2018\)](#), [Neris Michel Enamorado Escalona \(20/09/2017\)](#), [Noelia Blanco Menéndez \(14/11/2014\)](#). They all have obtained positions as postdocs in renowned international Institutes or went to Industry.

- 10 Master students (directing the Master's degree dissertation)

- 8 postdoctoral researchers supervised. Those egressed obtained independent positions abroad and in Spain

C7. Teaching activity

2015-2017 Honorary Professor at Biochemistry Department of UAM, Madrid. I have participated in teaching activities in numerous post-graduate studies and I have directed 10 master theses.

C8. Science management

I have also served in the **organization and managing of Science at the Spanish Agency for Research** since 2017, first as Chair of the Immunity, Infection and Immunotherapy subarea in Biomedicine (BME-IIT, jul2017-sep2020) and subsequently as Chair of Biomedicine Area (oct2020 onwards). **International grant reviewer** and ad hoc reviewer for numerous international journals.

C9. Outreach

I have also contributed to **outreach activities** and collaboration with my immunology colleagues by participating actively in the **Spanish Society for Immunology (SEI)** as member of the governing board (2014-2018). I was also **Editor of the SEI magazine** (2013-2017), participating in outreach activities since 2013.