

# MARCOS DÍAZ GAY

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## SUMMARY

I am a postdoctoral researcher in the group of Dr. Ludmil B. Alexandrov at UC San Diego. Originally trained in engineering, I have focused my career on computational biology, with a strong interest in cancer genomics data analysis.

My research focuses on developing new computational methodologies that allow the discovery of the underlying mechanisms of cancer predisposition and progression based on specific signatures of somatic mutations. I have an interest in applying these innovative methods to diverse cohorts of cancer patients to better understand the dynamics and evolution of tumors worldwide and to comprehensively characterize the processes leading to tumorigenesis in different populations.

## EDUCATION

University of Barcelona                      **Ph.D. | Medicine and Translational Research**  
2019

University of Barcelona                      **M.S. | Biomedicine**  
2016

University of A Coruña                      **B.S. & M.S. | Civil Engineering**  
2015

## TEACHING EXPERIENCE

University of California                      **Lecturer**  
San Diego                                      Instructor of record for the Bioinformatics Laboratory (BIMM 143)  
2023    undergraduate course offered by the School of Biological Sciences (Spring  
2023 quarter – 60 hours).

Wellcome Connecting Science              **Course Instructor**  
2023 – 2022                                      Cancer Genome Analysis Africa (40 hours – online) and Latin America and  
the Caribbean (60 hours – in person) global training courses. Led mutational  
signatures module, including lecture and practical hands-on session.  
Collaborated in other modules.

National Cancer Institute,  
National Institutes of Health              **Course Instructor**  
2023    Emerging Approaches for Tumor Analyses in Epidemiological Studies online  
course offered by the Division of Cancer Epidemiology and Genetics.  
Lectured on mutational signatures and assisted during practical session.

## RESEARCH EXPERIENCE

University of California                      **Postdoctoral Scholar**  
San Diego                                      Advisor: Ludmil B. Alexandrov  
2020 – present

- Analysis of the mutagenic forces driving lung cancer in never smokers (Sherlock project, in collaboration with the National Cancer Institute).
- Analysis of mutational signatures in colorectal cancer from 11 countries of varying incidence (Mutographs project, in collaboration with the Wellcome Sanger Institute and IARC – World Health Organization).
- Developed most advanced tools for extraction (published and cover of Cell Genomics) and assignment of mutational signatures (published in Bioinformatics).

**August Pi i Sunyer Biomedical Research Institute (IDIBAPS)**  
2016 – 2019

**Ph.D. Student**

Advisors: Sergi Castellví-Bel & Francesc Balaguer

- Identified novel genes involved in colorectal cancer predisposition.
- Developed web-based application for mutational signature analysis.

**University of California San Diego**  
2019

**Visiting Graduate Student**

Advisor: Ludmil B. Alexandrov

- Four months international research stay funded by a competitive grant.
- Developed somatic variant calling pipeline and performed mutational signature analysis.

**August Pi i Sunyer Biomedical Research Institute (IDIBAPS)**  
2015 – 2016

**Master's Student**

Advisor: Sergi Castellví-Bel

- Developed germline-somatic variant prioritization pipeline for novel predisposition genes involved in colorectal cancer.

**University of A Coruña**  
2013 – 2015

**Undergraduate Research Assistant**

Advisor: Joaquín Suárez

- Collaborated in the Water and Environmental Engineering group

## **PUBLICATIONS**

Total number of publications: 28 (3 *submitted*) | Citations: 614 | h-index: 14 ([Google scholar](#))

### Original articles as senior author

1. Assigning mutational signatures to individual samples and individual somatic mutations with SigProfilerAssignment  
**Díaz-Gay M.**<sup>^</sup> *et al. **Bioinformatics**. 2023;39(12):btad756. Citations: 15 (Google Scholar). Journal Impact Factor: 5.8 – Q1 (Clarivate Journal Citation Reports 2022).*
- <sup>^</sup> shared corresponding author

### Original articles as first author

2. The mutagenic forces shaping the genomic landscape of lung cancer in never smokers  
**Díaz-Gay M. et al. medRxiv. 2024. Submitted (under review).**
3. Uncovering novel mutational signatures by *de novo* extraction with SigProfilerExtractor  
Islam S.M.A.\*<sup>,</sup> **Díaz-Gay M.\* et al. **Cell Genomics**. 2022;2(11):100179. Cit: 159.**  
<sup>\*</sup> shared first authors
4. Using linkage studies combined with whole-exome sequencing to identify novel candidate genes for familial colorectal cancer  
Toma C.\*<sup>,</sup> **Díaz-Gay M.\* et al. **International Journal of Cancer**. 2020;146(6):1568–1577. Cit: 11. JIF: 7.396 – Q1 (Clarivate JCR 2020).**
5. Identification of a novel candidate gene for serrated polyposis syndrome by performing linkage analysis combined with whole-exome sequencing  
Toma C.\*<sup>,</sup> **Díaz-Gay M.\* et al. **Clinical and Translational Gastroenterology**. 2019;10(10):e00100. Cit: 8. JIF: 3.968 – Q2.**
6. Integrated analysis of germline and tumor DNA identifies new candidate genes involved in familial colorectal cancer  
**Díaz-Gay M. et al. **Cancers**. 2019;11(3):362. Cit: 20. JIF: 6.126 – Q1.**
7. Mutational signatures in cancer (MuSiCa): a web application to implement mutational signatures analysis in cancer samples  
**Díaz-Gay M. et al. **BMC Bioinformatics**. 2018;19(1):224. Cit: 98. JIF: 2.511 – Q1.**

### Reviews and book chapters as first author

8. Unraveling the genomic landscape of colorectal cancer through mutational signatures [*book chapter*]  
Díaz-Gay M. & Alexandrov L.B. *Advances in Cancer Research: "Novel Approaches to Colorectal Cancer"*. 2021;151:385-424. Cit: 18. JIF: 5.767 – Q2.
9. Somatic mutational signatures in polyposis and colorectal cancer [*review*]  
Grolleman J.\*, Díaz-Gay M.\* et al. *Molecular Aspects of Medicine*. 2019;69:62–72. Cit: 16. JIF: 9.577 – D1.

### Original articles as second author

10. Geographic variation of mutagenic exposures in kidney cancer genomes  
Senkin S.\*, Moody S.\*, Díaz-Gay M. et al. *Nature*. 2024. In press. Cit: 4. JIF: 64.8 – D1.
11. Topography of mutational signatures in human cancer  
Otlu B., Díaz-Gay M. et al. *Cell Reports*. 2023;42(8):112930. Cit: 19. JIF: 8.8 – Q1.
12. Comprehensive genomic characterization of early-onset Lynch-like syndrome colorectal cancers  
Golubicki M., Díaz-Gay M. et al. *Cancers*. 2021;13(6):1259. Cit: 7. JIF: 6.575 – Q1.

### Original articles in collaboration

13. The complexity of tobacco smoke-induced mutagenesis in head and neck cancer  
Torrens L. et al. *medRxiv*. 2024. Submitted (under review).
14. APOBEC shapes tumor evolution and age at onset of lung cancer in smokers  
Zhang T. et al. *bioRxiv*. 2024. Submitted (under review).
15. Deep learning predicts HRD and platinum response from histology slides in breast and ovarian cancer  
Bergstrom E. et al. *Journal of Clinical Oncology*. 2024. In press. Cit: 1. JIF: 45.4 – D1.
16. *CTNND1* is involved in germline predisposition to early-onset gastric cancer by affecting cell-to-cell interactions  
Herrera-Pariente C. et al. *Gastric Cancer*. 2024. In press. JIF: 7.4 – Q1.
17. Visualizing and exploring patterns of large mutational events with SigProfilerMatrixGenerator  
Khandekar A. et al. *BMC Genomics*. 2023;24(1):469. Cit: 6. JIF: 4.4 – Q1.
18. Unraveling the impact of a germline heterozygous *POLD1* frameshift variant in serrated polyposis syndrome  
Bonjoch L. et al. *Frontiers in Molecular Biosciences*. 2023;10:1119900. Cit: 4. JIF: 5.0 – Q2.
19. Germline mutations in *WNK2* could be associated with serrated polyposis syndrome  
Soares de Lima Y. et al. *Journal of Medical Genetics*. 2023;60(6):557-567. Cit: 3. JIF: 4.0 – Q2.
20. Germline and somatic whole-exome sequencing identifies new candidate genes involved in familial predisposition to serrated polyposis syndrome  
Soares de Lima Y. et al. *Cancers*. 2021;13(4):929. Cit: 15. JIF: 6.575 – Q1.
21. Identification of new genes involved in germline predisposition to early-onset gastric cancer  
Herrera-Pariente C. et al. *International Journal of Molecular Sciences*. 2021;22(3):1310. Cit: 11. JIF: 6.208–Q1
22. Germline biallelic mutations in *MCM8* are associated with early-onset lynch-like syndrome  
Golubicki M. et al. *JCI Insight*. 2020;5(18):e140698. Cit: 28. JIF: 8.315 – Q1.
23. Germline mutations in *FAF1* are associated with hereditary colorectal cancer  
Bonjoch L. et al. *Gastroenterology*. 2020;159(1):227-240. Cit: 21. JIF: 22.682 – D1.
24. Colorectal cancer genetic variants are also associated with serrated polyposis syndrome susceptibility  
Arnau-Collell C. et al. *Journal of Medical Genetics*. 2020;57(10):677-682. Cit: 15. JIF: 6.318 – Q1.
25. CNApp, a tool for the quantification of copy number alterations and integrative analysis revealing clinical implications  
Franch-Expósito S. et al. *eLife*. 2020;9:e50267. Cit: 56. JIF: 8.146 – D1.
26. Quantitative analysis of somatically-acquired and constitutive uniparental disomy in gastrointestinal cancers

- Torabi K. *et al. International Journal of Cancer*. 2019;144(3):513–524. Cit: 9. JIF: 5.145 – Q1.
27. Rare germline copy number variants in colorectal cancer predisposition characterized by exome sequencing analysis  
Franch-Expósito S. *et al. Journal of Genetics and Genomics*. 2018;45(1):41–45. Cit: 18. JIF: 4.65 – Q1.
28. *POLE* and *POLD1* screening in 155 patients with multiple polyps and early-onset colorectal cancer  
Esteban-Jurado C. *et al. Oncotarget*. 2017;8(16):26732–26743. Cit: 52. JIF: 5.168 – Q1.

## FUNDING

University of Barcelona 2018	Faculty of Medicine Short-Term International Research Stay Fellowship Amount: 3,000€.
Regional Government of Catalunya 2017 – 2019	Agency for Management of University and Research Grants (AGAUR) Ph.D. Fellowship (FI-2017) Amount: 61,200€. 3 years fellowship covering salary and tuition.
Spanish Ministry of Education 2014	Department Collaboration Scholarship University of A Coruña. Department of Mathematical and Representation Methods. Amount: 2,000€.
University of A Coruña 2013	Lab Collaboration Scholarship School of Civil Engineering. Water and Environmental Engineering Group. Amount: 3,150€.

## HONORS & AWARDS

Spanish Ministry of Universities 2022	National Faculty Habilitations for Assistant and Associate Professor (Profesor Ayudante Doctor / Profesor Contratado Doctor / Profesor de Universidad Privada) Spanish National Agency for Quality Assessment and Accreditation (ANECA) and Catalan University Quality Assurance Agency (AQU Catalunya).
University of Barcelona 2019	<i>Cum Laude</i> Honors & International Mention (Ph.D.) Faculty of Medicine.
University of Barcelona 2018	Extraordinary Master's Degree Award Faculty of Medicine.
University of A Coruña 2016	Extraordinary End-Of-Degree Award School of Civil Engineering.

## MEMBERSHIP IN PROFESSIONAL ASSOCIATIONS

### Professional Associations

- European Association for Cancer Research (EACR) May 2021 – present
- Spanish Association for Cancer Research (ASEICA) May 2021 – present
- Spanish Scientists in the USA (ECUSA) Jan 2021 – present
- American Association for Cancer Research (AACR) Nov 2019 – present

## SERVICE

### Peer-reviewed articles

**BMC Bioinformatics (BMC)** 1 article

**Cancers (MDPI)** 1 article

**Cell Genomics (Cell Press)** 1 article

**Cell Reports Medicine (Cell Press)** 1 article

**Communications Biology (Springer Nature)** 1 article (2 reviews)

**Computational and Structural Biotechnology Journal (Elsevier)** 1 article

**Genes (MDPI)** 2 articles (3 reviews)

**Human Genomics (BMC)** 1 article (3 reviews)

**Heliyon (Elsevier)** 1 article (2 reviews)

**Journal of Personalized Medicine (MDPI)** 1 article (2 reviews)

**PLOS Computational Biology (Public Library of Science)** 1 article (2 reviews)

## RESEARCH PROJECTS

### Collaborator

#### 1. **Mutographs**

Cancer Grand Challenges (Cancer Research UK)

01/2017 – 12/2023

20,000,000£

PI: Mike Stratton (Leader work area 2: Ludmil B. Alexandrov)

#### 2. **Caracterización funcional de variantes en nuevos genes candidatos en la predisposición germinal al cáncer colorrectal y el síndrome de poliposis serrada (FUNCTION4GENE)**

Instituto de Salud Carlos III

Program: Fondo de Investigación Sanitaria (FIS)

ID: PI17/00878

01/2018 – 06/2022

100,430€

PI: Sergi Castellví Bel

#### 3. **Identifying biomarkers through translational research for prevention and stratification of colorectal cancer (TRANSCOLONCAN)**

European Union

Program: COST programme

ID: Action CA17118

11/2018 – 04/2022

234,580€

PI: Sergi Castellví Bel

#### 4. **Grupo de Investigación en Predisposición Genética al Cáncer Gastrointestinal**

Agencia de Gestio d'Ajuts Universitaris i de Recerca - Generalitat De Catalunya

Programa: Grupo de Investigación Pre-consolidado Reconocido

ID: GRPRE 2017SGR21

01/2017 – 09/2021

PI: Sergi Castellví Bel

#### 5. **Prevenió del càncer colorrectal en la població de risc mitjà mitjançant biomarcadors genòmics i microbiòmics (CRIPREV)**

Departament de Salut, Generalitat de Catalunya

Program: Pla estratègic de recerca i innovació en salut (PERIS)

ID: SLT002/16/00398

03/2017 – 12/2019

280,479€

PI: Antoni Castells Garangou

6. **Identificación de nuevos biomarcadores para la prevención del cáncer colorrectal**

Fundacion Científica Asociación Española Contra el Cáncer

ID: GCB13131592CAST

10/2013 – 09/2019

553,500€

PI: Antoni Castells Garangou

7. **Cooperation studies on inherited susceptibility to colorectal cancer**

European Union

Program: COST programme

ID: CE\_COST\_2012 Action BM1206

06/2013 – 05/2018

244,350€

PI: Sergi Castellví Bel

8. **Identificación de genes de predisposición germinal en un subgrupo de cáncer colorrectal: el síndrome de poliposis serrada en el punto de mira**

Instituto de Salud Carlos III

Program: Fondo de Investigación Sanitaria (FIS)

ID: PI14/00173

01/2015 – 12/2017

94,380€

PI: Sergi Castellví Bel

9. **Grupo de Investigación en Oncología Gastrointestinal y Pancreática**

Agencia de Gestio d'Ajuts Universitaris i de Recerca - Generalitat De Catalunya

ID: 2014SGR135

01/2014 – 07/2017

50,000€

PI: Antoni Castells Garangou

10. **Grupo de Investigación en Predisposición Genética al Cáncer Colorrectal**

Agencia de Gestio d'Ajuts Universitaris i de Recerca - Generalitat De Catalunya

Programa: Grupo de Investigación Emergente Reconocido

ID: GRE 2014SGR255

01/2014 – 04/2017

PI: Sergi Castellví Bel

## CONFERENCE COMMUNICATIONS

### Invited talks

1. Unravelling the genomic landscape of cancer through mutational signatures.  
**Curso de Entrenamiento Intensivo para el Manejo Interdisciplinario de los Tumores Digestivos, Intergrupo Argentino para el Tratamiento de los Tumores Gastrointestinales** (virtual), 09/2023.
2. Unravelling the genomic landscape of cancer through mutational signatures.  
**Future Leaders Virtual Seminar Series, Cancer Grand Challenges (CRUK & NCI)** (virtual), 07/2023.
3. Uncovering novel mutational signatures of tobacco smoking with SigProfilerExtractor.  
**SoCal Genome Stability Symposium, UC Irvine, Irvine, CA, USA, 12/2022.**

4. Unraveling the genomic landscape of cancer through mutational signature extraction and assignment.  
**Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS)**, Barcelona, Spain, 11/2022.
5. Unraveling the genomic landscape of cancer through *de novo* extraction of mutational signatures.  
**ISCB academy, International Society for Computational Biology** (virtual), 06/2022.
6. A new user-friendly web application to implement mutational signatures analysis.  
**European Congress of Pathology, European Society of Pathology**, Nice, France, 09/2019.

### Oral communications

7. Assigning mutational signatures to individual samples and individual somatic mutations with SigProfilerAssignment.  
**RECOMB-CCB, International Society for Computational Biology**, Boston, MA, USA, 04/2024.
8. The mutagenic forces shaping the genomic landscape of lung cancer in never smokers.  
**AACR Annual Conference, American Association for Cancer Research**, San Diego, CA, USA, 04/2024.
9. Genomic characterization of colorectal cancer across the world by *de novo* extraction of mutational signatures with SigProfilerExtractor.  
**European Association for Cancer Research Congress**, Sevilla, Spain, 06/2022.
10. SigProfilerWeb: a user-friendly web application for mutational signatures refitting according to the new COSMIC framework.  
**European Hereditary Tumour Group Meeting**, Barcelona, Spain, 10/2019.
11. Integrated analysis of germline and tumor DNA identifies new candidate genes involved in familial colorectal cancer.  
**Human Genome Meeting, Human Genome Organisation**, Barcelona, Spain, 02/2017.
12. Integrated analysis of germline and tumor DNA for the identification of new genes involved in familial colorectal cancer.  
**Bioinformatics and Genomics Symposium, Societat Catalana de Biologia**, Barcelona, Spain, 12/2016.
13. Highway runoff treatment evaluation using continuous turbidity measurements.  
**International Conference on Diffuse Pollution and Eutrophication, International Water Association**, Berlin, Germany, 09/2015.

### Posters

14. Uncovering novel mutational signatures by *de novo* extraction with SigProfilerExtractor.  
**Future Leaders Conference, Cancer Grand Challenges (CRUK & NCI)**, Barcelona, Spain, 11/2022.
15. Uncovering novel mutational signatures by *de novo* extraction with SigProfilerExtractor.  
**Moore's Cancer Center Delivering Discoveries Scientific Retreat, UC San Diego**, La Jolla, CA, USA, 10/2022.
16. Enrichment of polymerase epsilon and delta exonuclease domain mutations in microsatellite unstable human cancers.  
**Structural and Functional Genomics Program Annual Retreat, UC San Diego**, La Jolla, CA, USA, 03/2022.
17. Enrichment of polymerase epsilon and delta exonuclease domain mutations in microsatellite unstable human cancers.  
**Moore's Cancer Center Delivering Discoveries Scientific Retreat, UC San Diego** (virtual), 11/2021.
18. Enrichment of polymerase epsilon and delta exonuclease domain mutations in microsatellite unstable human cancers.  
**SoCal Genome Stability Symposium, The Scripps Research Institute** (virtual), 09/2021. (**Best poster prize**).
19. Integrated analysis of germline and tumor DNA identifies new candidate genes involved in familial colorectal cancer.  
**IDIBAPS PhD Day, Institut d'Investigacions Biomèdiques August Pi i Sunyer**, Barcelona, Spain, 06/2019.

20. Integrated analysis of germline and tumor DNA for the identification of new candidate genes involved in familial colorectal cancer.  
**Bioinformatics and Genomics Symposium, Societat Catalana de Biologia**, Barcelona, Spain, 12/2018.
21. Integrated analysis of germline and tumor DNA for the identification of new candidate genes involved in familial colorectal cancer.  
**Jornadas Científicas CIBERehd**, Barcelona, Spain, 11/2018.
22. Mutational Signatures in Cancer (MuSiC): a web application to implement mutational signatures framework in cancer samples.  
**Bioinformatics and Genomics Symposium, Societat Catalana de Biologia**, Barcelona, Spain, 12/2017.
23. Integrated analysis of germline and tumor DNA for the identification of new candidate genes involved in familial colorectal cancer.  
**European Human Genetics Conference, European Society of Human Genetics**, Copenhagen, Denmark, 05/2017.
24. Integrated analysis of germline and tumor DNA identifies new candidate genes involved in familial colorectal cancer.  
**Translating Colorectal Cancer Research Workshop, COST EuCOLONGENE**, Porto, Portugal, 02/2017.
25. Identification of new genes involved in familial colorectal cancer: integrated analysis of germline and tumor DNA.  
**Jornadas Científicas CIBERehd**, Barcelona, Spain, 10/2016. (**Best poster prize**).
26. Constructed wetlands for the treatment of domestic sewage in rural areas of Galicia (Spain): case studies.  
**International Society for Environmental Biotechnology**, Barcelona, Spain, 06/2016.

## MENTORING EXPERIENCE

<p><b>Zichen (Cardiff) Jiang</b> 2021 – 2023</p>	<p><b>Undergraduate Student, Biology, UC San Diego</b> BISP 196 course (Senior Honors Thesis Program). BENG 199 course (Independent Study for Undergraduates). Development of an unmatched somatic variant calling pipeline. Currently bioengineering master student at UC San Diego.</p>
<p><b>Xi (Sam) Wang</b> 2021 – 2022</p>	<p><b>Undergraduate Student, Bioengineering, UC San Diego</b> BENG 199 course (Independent Study for Undergraduates). Benchmarking of bioinformatics tools for mutational signature assignment. Currently biomedical informatics master student at Harvard Medical School.</p>
<p><b>Yasmin Soares de Lima</b> 2019</p>	<p><b>Ph.D. Student, Medicine and Translational Research, University of Barcelona</b> Identification of novel genes involved in predisposition to serrated polyposis syndrome by a germline-tumor integrated analysis. First-author in publication 17. Collaborator in publications 3 and 4.</p>
<p><b>Roser Capó-García</b> 2018</p>	<p><b>Master's Student, Biomedicine, University of Barcelona</b> Identification of novel predisposition genes in early-onset gastric cancer. Collaborator in publication 18.</p>
<p><b>Mariano Golubicki</b> 2017 – 2018</p>	<p><b>Ph.D. Student, Biochemistry, University of Buenos Aires (Argentina)</b> Genomic characterization of Lynch-like syndrome colorectal cancers. First-author in publication 11. Collaborator in publication 18.</p>
<p><b>Paula Alejandra Sánchez-Rojas</b> 2017</p>	<p><b>Master's Student, Biomedicine, University of Barcelona</b> Identification of novel predisposition genes in familial colorectal cancer. Collaborator in publication 5.</p>



## TEACHING TRAINING

University of California  
San Diego  
2022

### Introduction to College Teaching

Preparation to be an instructor of record by developing evidence-based effective teaching practices that support student learning (30 hours).

University of California  
San Diego  
2021

### Pathways to Scientific Teaching

Life sciences postdoc training in scientific teaching. Development of learner-centered instructional materials and teaching strategies (18 hours).

## COMPUTATIONAL SKILLS

**Programming languages** Proficient in R scripting programming (8 years of experience in NGS analysis, statistical analysis, data mining, and data visualization). Working knowledge of Python, Shiny web development environment, UNIX shell scripting, and HPC cluster environments. Basic knowledge of CSS, Fortran, HTML, JavaScript, MySQL, and Perl.

**Software and websites** Co-author and maintainer of the [SigProfilerAssignment](#) Shiny web application, [SigProfilerMatrixGenerator](#), [SigProfilerExtractor](#), and [SigProfilerAssignment](#) Python/R packages for mutational signature analysis, and the [COSMIC Mutational Signatures](#) website.

**Bioinformatic tools** Bioconductor, Conda, IGV, ImageJ, PyPI, and GitHub user ([github.com/marcos-diazg](https://github.com/marcos-diazg)).

## LANGUAGE SKILLS

**Spanish** Native speaker | **Galician** Native speaker | **Catalan** Limited working proficiency

**English** Full professional proficiency (C1 Cambridge CAE certificate) | **Portuguese** Limited working proficiency

**French** Limited working proficiency (B2 DELF certificate)

## REFERENCES

**Ludmil B. Alexandrov, Ph.D.** (Postdoctoral Advisor)

Cellular and Molecular Medicine, and Bioengineering departments, Moores Cancer Center, University of California San Diego. 92093 La Jolla, CA (United States of America). (+1) 858 246 2747. [l2alexandrov@ucsd.edu](mailto:l2alexandrov@ucsd.edu)

**Sergi Castellví-Bel, Ph.D.** (Ph.D. Advisor)

Genetic Predisposition to Gastrointestinal Cancer group, August Pi i Sunyer Biomedical Research Institute (IDIBAPS), CIBERehd, Hospital Clínic. 08036 Barcelona (Spain). (+34) 93 227 54 00 ext.4183. [sbel@clinic.cat](mailto:sbel@clinic.cat)

**Francesc Balaguer, M.D., Ph.D.** (Ph.D. Advisor)

Gastroenterology department, Hospital Clínic, CIBERehd, IDIBAPS. 08036 Barcelona (Spain). (+34) 93 227 54 00 ext.2802. [fprunes@clinic.cat](mailto:fprunes@clinic.cat)

**Jordi Camps, Ph.D.** (Collaborator)

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