

Curriculum vitae

Name: **SERUGGIA, Davide**
 Researcher ID: [T-9574-2019](https://orcid.org/0000-0001-5014-0499), ORCID 0000-0001-5014-0499

1) Education and Training:

- 10/2010 - 12/2014 **Doctoral thesis** in Molecular Biology at the CNB-CSIC, Universidad Autonoma de Madrid, Spain, thesis: *Structural and functional description of the mouse Tyr locus*, (PhD supervisor: Lluís Montoliu).
- 09/2008 - 03/2010 **Master of Science** in Medical Biotechnology at University of Milan-Bicocca, Italy.
- 09/2003 - 07/2007 **Bachelor of Science** in Biotechnology at University of Milan-Bicocca, Italy.

2) Professional Academic Positions

Current position(s):

01/2021 - present Principal Investigator in Pediatric Leukemia Biology, St. Anna CCRI, Vienna.

Previous positions:

- 09/2019 – 12/2020 Instructor in Pediatrics, Harvard Medical School
- 10/2015 - 09/2019 Postdoctoral scientist at Boston Children's Hospital and Harvard Medical School, Boston, US. PI: Dr. Stuart H. Orkin
- 12/2014 - 09/2015 Postdoctoral scientist at the CNB, Madrid, Spain, PI: Dr. Lluís Montoliu
- 10/2010 - 12/2014 PhD student at the CNB, Madrid, Spain, PI: Dr. Lluís Montoliu (La Caixa International PhD Fellowship)
- 04/2013 - 07/2013 Visiting PhD student at the University of Zurich, Switzerland, PI: Dr. Pawel Pelczar (EMBO Short Term Fellowship)
- 03/2010 - 09/2010 Graduate student at the University of Milan-Bicocca, Italy, PI: Dr. Francesco Mantegazza
- 06/2009 - 12/2009 Undergraduate student at the Institute for Cell Biology at the University of Witten, Germany, PI: Dr. Hans J. Lipps

3) Publications

As postdoc (2015-2020):

- Singh H, **Seruggia D**, Saxena M, Madha S, Nagaraja AK, Wu Z, Zhou J, Huebner AJ, Maglieri A, Wezenbeek J, Hochedlinger K, Orkin SH, Bass AJ, Shivdasani RA. Intestinalization of stomach epithelium depends on a shadow Cdx2 cis-element and direct CDX2 binding to intestinal enhancers (under review)
- Seruggia D**, Josa S, Fernandez A, Montoliu L. The structure and function of the mouse Tyrosinase locus. **Pigment Cell Melanoma Res** 2020 Oct 23. doi: 10.1111/pcmr.12942
- Seruggia D**, Fernández A, Cantero M, Fernandez-Miñan A, Gomez-Skarmeta JL, Pelczar P, Montoliu L. Boundary sequences flanking the mouse tyrosinase locus ensure faithful pattern of gene expression. **Scientific Reports** 2020 <https://doi.org/10.1038/s41598-020-72543-0>
- Manieri E, Estaban-Lafuente L, Rodriguez ME, Leiva-Vega L, Cubero FJ, Barrett T, Cavanagh-Kyros J, **Seruggia D**, Monte MJ, Marin J, Davis RJ, Mora A, Sabio G. JNK-mediated disruption of bile acid homeostasis promotes intrahepatic cholangiocarcinoma. **PNAS** 2020 Jun 29;202002672.
- Cai W, Huang J, Zhu Q, Li BE, **Seruggia D**, Zhou P, Nguyen M, Fujiwara Y, Xie H, Yang Z, Hong D, Ren P, Xu J, Pu WT, Yuan GC, Orkin SH. Enhancer-dependence of gene expression increases with developmental age. **PNAS** 2020 Sep 1;117(35):21450-21458
- Sher F¹, Hossain M¹, **Seruggia D**¹, Schoonenberg VAC, Yao Q, Cifani P, Dassama LMK, Cole MA, Ren C, Vinjamur DS, Macias-Trevino C, Luk K, McGuckin C, Schupp PG, Canver MC,

Kurita R, Nakamura Y, Fujiwara Y, Wolfe SA, Pinello L, Maeda T, Kentsis A, Orkin SH, Bauer DE. Rational targeting of a NuRD subcomplex guided by comprehensive in situ mutagenesis. **Nat Genet.** 2019 Jul;51(7):1149-1159 [1equal contribution]

7. **Seruggia D**, Oti M, Tripathi P, Canver MC, LeBlanc L, Di Giammartino DC, Bullen MJ, Nefzger CM, Sun YBY, Farouni R, Polo JM, Pinello L, Apostolou E, Kim J, Orkin SH, Das PP. TAF5L and TAF6L Maintain Self-Renewal of Embryonic Stem Cells via the MYC Regulatory Network. **Mol Cell.** 2019 Jun 20;74(6):1148-1163.e7
8. Di Pilato M, Kim EY, Cadilha BL, Prüssmann JN, Nasrallah MN, **Seruggia D**, Usmani SM, Misale S, Zappulli V, Carrizosa E, Mani V, Ligorio M, Warner RD, Medoff BD, Marangoni F, Villani AC, Mempel TR. Targeting the CBM complex causes Treg cells to prime tumours for immune checkpoint therapy. **Nature.** 2019 Jun;570(7759):112-116
9. Debruyne DN, Dries R, Sengupta S, **Seruggia D**, Day D, Gao Y, Sharma B, Huang H, Moreau L, McLane M, Marco E, Chen T, Gray NS, Wong K, Orkin SH, Yuan GC, Young RA, George RE. The CTCF paralog, BORIS, promotes novel chromatin-based regulatory interactions in treatment-resistant cancer cells. **Nature** 2019 Aug;572(7771):676-680.
10. LeBlanc L, Lee BK, Yu AC, Kim M, Kambhampati AV, Dupont SM, **Seruggia D**, Ryu BU, Orkin SH, Kim J. Yap1 safeguards mouse embryonic stem cells from excessive apoptosis during differentiation. **Elife.** 2018 Dec 18;7

As PhD Student (2010-2015):

11. Josa S, **Seruggia D**, Fernandez A, Montoliu L. Concepts and tools for gene editing. **Reprod. Fertil. Dev.** 2016 Jan;29(1):1-7
12. Wang J, Vicente-García C, **Seruggia D**, Moltó E, Fernandez-Miñán A, Neto A, Lee E, Gómez-Skarmeta JL, Montoliu L, Lunnyak VV, Jordan IK. MIR retrotransposon sequences provide insulators to the human genome. **PNAS.** 2015 Aug 11;112(32):E4428-37.
13. **Seruggia D**, Fernández A, Cantero M, Pelczar P, Montoliu L. Functional validation of mouse tyrosinase non-coding regulatory DNA elements by CRISPR-Cas9-mediated mutagenesis. **Nucleic Acids Res.** 2015 May 26;43(10):4855-67.
14. **Seruggia D**, Montoliu L. The new CRISPR-Cas system: RNA-guided genome engineering to efficiently produce any desired genetic alteration in animals. **Transgenic Res.** 2014 Oct;23(5):707-16.
15. Court F, Camprubi C, Garcia CV, Guillaumet-Adkins A, Sparago A, **Seruggia D**, Sandoval J, Esteller M, Martin-Trujillo A, Riccio A, Montoliu L, Monk D. The PEG13-DMR and brain-specific enhancers dictate imprinted expression within the 8q24 intellectual disability risk locus. **Epigenetics Chromatin.** 2014 Mar 25;7(1):5.
16. Hermann M, Stillhard P, Wildner H, **Seruggia D**, Kapp V, Sánchez-Iranzo H, Mercader N, Montoliu L, Zeilhofer HU, Pelczar P. Binary recombinase systems for high-resolution conditional mutagenesis. **Nucleic Acids Res.** 2014 Apr;42(6):3894-907.

As undergraduate Student (2008-2010):

17. Cassina V, **Seruggia D**, Beretta GL, Salerno D, Brogioli D, Manzini S, Zunino F, Mantegazza F. Atomic force microscopy study of DNA conformation in the presence of drugs. **Eur Biophys J.** 2011 Jan;40(1):59-68.
18. Rupperecht S, Hagedorn C, **Seruggia D**, Magnusson T, Wagner E, Ogris M, Lipps HJ. Controlled removal of a nonviral episomal vector from transfected cells. **Gene.** 2010 Oct 15;466(1-2):36-42.
19. Salerno D, Brogioli D, Cassina V, Turchi D, Beretta GL, **Seruggia D**, Ziano R, Zunino F, Mantegazza F. Magnetic tweezers measurements of the nanomechanical properties of DNA in the presence of drugs. **Nucleic Acids Res.** 2010 Nov;38(20):7089-99.

Research monographs:

1. Harms DW¹, Quadros RM¹, **Seruggia D**¹, Ohtsuka M¹, Takahashi G, Montoliu L, Gurumurthy

CB. Mouse Genome Editing Using the CRISPR/Cas System. **Curr Protoc Hum Genet.** 2014 Oct 1;83:15.7.1-27. (1equal contribution)

2. **Seruggia D**, Montoliu L. CRISPR/Cas9 approaches to investigate the noncoding genome. 2016 Book chapter in **Genome editing**, Springer

Citation metrics (Google Scholar; Jan 2021): **total citations: 666; H-index: 13**

4) Honours and Awards

Fellowships:

2013	EMBO Short Term Fellowship, funding for 3 months in the Pelczar lab
2013	Boehringer Ingelheim Fonds Travel Grant (declined to accept EMBO STF)
2010	La Caixa International PhD Fellowship - ranked first among +300 applicants
2010	Leonardo Unipharma Fellowship (declined to accept La Caixa)
2010	Borsa di Ricerca (10B047), University of Milano-Bicocca
2009	ExTra [external training] fellowship funding for 6 months in the Lipps lab

Awards

2020	ISSNAF Young Investigator Award, finalist
2014	ISTT Registration Award TT2014 meeting, Edinburgh
2013	Travel Grant to the IMGS Meeting, Salamanca, Spain
2012	Travel Grant to Cantabria Campus Nobel, Santander, Spain
2011	Travel Grant to SEBBM Meeting, Barcelona, Spain

5) Teaching/supervising Experience

Supervision of students:

2015 - present	2 research assistants at the Boston Children's Hospital, Boston, US
2010 - 2014	3 master students at the CNB, Madrid, Spain

Reviewing activities:

2014 - 2015	Reviewer for BMC Biotechnology
2015 -	Reviewer for International Journal of Molecular Sciences
2015 -	Reviewer for Inside the Cell
2020 -	Reviewer for Frontiers

6) Selected Invited Conferences and Talks

2020	ISSNAF Young Investigator Award – <i>Epigenetic vulnerabilities in stem cells and cancer</i>
2020	MBG Young Investigator Symposium 2020, Aarhus, Denmark - <i>Coding and non-coding elements in the control of gene expression</i>
2020	CCRI Seminar, Vienna, Austria - <i>The dark and bright side of epigenetics: interrogating chromatin modifiers and non-coding elements</i>
2019	Advances in Molecular Biology by Young Investigators Abroad, CNB, Madrid, Spain – Curated sgRNA libraries and dense in situ mutagenesis to study protein functions
2019	Danstem Special Seminar, Copenhagen, Denmark - The dark and bright side of epigenetics: interrogating chromatin modifiers and non-coding elements
2019	Symposium in Molecular Medicine & Precision Medicine, NMMC, Oslo, Norway - Dissecting functions of chromatin modifiers with CRISPR/Cas9
2019	CMMC Seminar, Koln, Germany - The dark and bright side of epigenetics: interrogating chromatin modifiers and non-coding elements
2019	IGMM Seminar, Montpellier, France - The dark and bright side of epigenetics: interrogating chromatin modifiers and non-coding elements
2019	Chromatin Proteomics FEBS Workshop, Heraklion, Greece – Transcriptional co-activators <i>Taf5l</i> and <i>Taf6l</i> control self-renewal of mouse embryonic stem cells.

- 2018 Infrafrontier Meeting, Munich, Germany – Uncoupling cellular fitness and fetal hemoglobin repression by targeting CHD4 CHDCT2 domain.
- 2015 Workshop on Innovative Mouse Model, Leiden, Netherlands - Interrogating the non-coding mouse genome using CRISPR-Cas9.
- 2014 Infrafrontier Meeting, Marseille, France – Genetic and functional analysis of non-coding DNA sequences using CRISPR/Cas9 tools at the mouse Tyr locus.
- 2014 CIBERER Meeting, Madrid, Spain - Using CRISPR/Cas9 approaches to target enhancers.
- 2014 Genome editing, practical application meeting, Madrid, Spain - From TALENs to CRISPRs: new tools for genome editing.
- 2013 International Mouse Genome Society Meeting, Salamanca, Spain - Targeted chromosomal inactivation of the mouse Tyr insulators with engineered nucleases.
- 2013 Workshop on Innovative Mouse Model, Leiden, Netherlands - Targeted chromosomal deletion of non-coding regulatory elements with TALENs.
- 2012 ESPCR Meeting, Genève, Switzerland - The nuclear structure of the mouse tyrosinase locus
- 2012 Cantabria Campus Nobel, Santander, Spain - Organization of mammalian expression domains.

7) Collaborations and International network

- Dr. Luca Pinello (collaborated on Seruggia et al. 2019 Mol Cell; Sher, Hossain and Seruggia 2019 Nat Gen), MGH, Boston, USA.
- Dr. Daniel Bauer (collaborated in Sher, Hossain and Seruggia 2019 Nat Gen), Boston Children's Hospital, Boston USA.
- Dr. Thorsten Mempel (collaborated in Di Pilato et al. 2019 Nature), MGH, Boston, USA.
- Dr. Rani George (collaborated on Debruyne et al. 2019 Nature), DFCI, Boston, USA.
- Dr. Pawel Pelczar (Seruggia et al. 2015; Hermann et al 2014), Center for Transgenic Models, University of Basel, Switzerland
- Dr. Effie Apostolou (Seruggia et al. 2019, Mol Cell) Weill Cornell, New York, USA
- Dr. Jonhwan Kim, (Leblanc et al. 2018 Elife; Seruggia et al. 2019 Mol Cell) University of Texas, USA
- Dr. Ramesh Shivdasani (*Cdx2* mouse model, unpublished) DFCI, Boston, USA
- Dr. Vijay Sankaran (humanized *Bcl11a* mouse model, unpublished), Boston Children's Hospital, Boston, USA
- Dr. Marcos Malumbres, (dense mutagenesis screening of CDKs, unpublished), CNIO, Madrid, Spain
- Dr. Guadalupe Sabio, (Manieri et. al, under review in *Cell Reports*), CNIC, Madrid, Spain
- Dr. Nadia Mercader (Hermann et al 2014) University of Bern, Bern, Switzerland

8) Funding

1. Functional investigation of non-coding sequences **Funded**
ERC-2020-StG, FIND-seq 947803 (PI Seruggia; 2021-2026; 1,784,000.00€)
 In this proposal, I present three different approaches to identify non-coding elements linked to drug resistance, to study chromatin interaction and 3D genome structure, and to dissect mutations at enhancers that are associated leukemia, at the nucleotide resolution.
2. Role of *ARID5B* in hematopoiesis and leukemia **Funded**
WES Foundation (PI Seruggia; 2020-2021 50,000.00\$)
ARID5B mutations are associated with increased risk of B-cell derived leukemia; however, *ARID5B* is poorly characterized. In this proposal, I will use mouse models to study the contribution of *Arid5b* in hematopoiesis and leukemia. Next, I will dissect sequence variation at *ARID5B* intron 3 associated with leukemia.
3. Targeting *MYC* through transcriptional co-activators in neuroblastoma **Funded**
Pedals for Pediatrics (PI: Seruggia; 2019-2021; 50,000.00\$)
 Previously, I identified two factors that control the amount of C-MYC produced in mouse embryonic stem cells. In the current proposal, we speculate to target the same genes in neuroblastoma, and

test whether we could reduce the levels of C-MYC to a non-pathological level, and therefore inhibit the growth of cancer cells.

4. Role of *TAF5L* and *TAF6L* in embryonic, adult stem cells and cancer **Funded/Declined**
Comunidad de Madrid, Spain (PI: Seruggia; 200,000.00€)

I previously described the role of *Taf5l* and *Taf6l* in controlling mESCs self-renewal. Here, I will dissect TAFs using dense in situ mutagenesis, and study this protein complex in adult stem cells and in the context of MYC-driven malignancies.