# CURRICULUM VITAE ET STUDIORUM

## Fabio Bordin

**INFORMATION**
Family name, first name: Bordin, Fabio
Born: March 20th, 1996, in Velletri (RM)
Email: fabio.bordin1996@gmail.com; fabio.bordin@uniroma1.it
Italian Citizen

**PRESENT POSITION:**

*November 2020 – on going:* **PhD Student,** Department of Molecular Medicine, "La Sapienza" University of Rome.

**EDUCATION AND RESEARCH EXPERIENCE:**

*November 2020 – on going (End date 31/01/2024):* **PhD Student,** Department of Molecular Medicine, "La Sapienza" University of Rome. Tutor: Prof. Enrico De Smaele

*October 2020:* **Master's Degree in Neurobiology (110/110 cum laude)** at "La Sapienza" University of Rome, Italy; experimental thesis: "*Role of KCASH2 protein in the regulation of the Hedgehog signaling pathway and characterization of the cerebellar phenotype of the KCASH2-KO mouse*". Tutor: Prof. Enrico De Smaele

*October 2019 - October 2020:* **Experimental internship** at Department of Molecular Medicine, "La Sapienza" University of Rome, Italy. Tutor: Prof. Enrico De Smaele

*October 2018:* **Bachelor's Degree in Biological Science (110/110 cum laude) )** at "La Sapienza" University of Rome, Italy; experimental thesis: "*Role of Dbx2 gene in neural aging of neural stem cells*". Tutor: Prof. Giuseppe Lupo

*October 2017 - October 2018:* **Experimental internship** at Department of Biology and Biotechnology "Charles Darwin", "La Sapienza" University of Rome, Italy. Tutor: Prof. Giuseppe Lupo

**TECHNICAL SKILLS:**

**Biochemistry skills**
Immunohistochemistry (IHC);
Immunofluorescence techniques (IF).

**Cellular Biology**
Maintenance and treatments of different types of cell cultures (in adhesion and suspension); Cell treatments; Proliferation assays (Edu, BrdU, MTT assay); Lentiviral Vectors production/infection; DNA/RNA transfection techniques; Gene modulation by RNAi; Luciferase assay; *in vitro* CRISPR-CAS9 knock-out and knock-in.

**Molecular Biology**
DNA and RNA isolation; Separation of nucleic acids by gel electrophoresis agarose; PCR; Cloning; Analysis of gene expression; RT-qPCR; Protein extraction, purification, quantification, SDS-PAGE and Western Blotting; Co-Immunoprecipitation; Post-translational modification analysis (Ubiquitination, Neddylation); Bacterial transformation; Mini, Midi and Maxi-Prep.

***In vivo-Ex vivo* experiments:** mice manipulation, tail cutting, toe clipping, anesthetic and euthanasic techniques. Surgery and tissues collection for RNA/protein analysis or for primary cell line cultures (astrocytes, granule cells from cerebellar) or neural stem cells cultures (from subventricular zone or hippocampal dentate gyrus)

**Computer skills**
Operating systems: Excellent
Statistics/Data Analysis: GraphPad Prism (excellent), ImageJ (excellent), Statminer: Good
Microsoft Office Package: Excellent
Internet: Excellent
Mail: Excellent
Other: Adobe Photoshop (Good)

## TUTORING AND TEACHING ACTIVITIES

*May 2023 – November 2023:* **Tutor** for teaching basic sciences on topic of Cell Biology and Neurobiology; Competition Announcement n° 8/2023 prot. n°0000669, University of Rome "La Sapienza", Faculty of Mathematical, Physic and Natural Sciences.

*November 2022 – January 2023:* **Tutor** with direct interlocution with students for the course of Comparative Neuroanatomy (Neurobiology master's degree); Competition Announcement n. 18/2022 for PhD Student, University of Rome "La Sapienza", Faculty of Mathematical, Physic and Natural Sciences.

*June 2021 – October 2021:* **Tutor** with direct interlocution with students for the course of Biotechnology; Competition Announcement n. 1/2021-B2 for PhD Student, University of Rome "La Sapienza", Faculty of Pharmacy and Medicine.

*December 2018 – September 2019*: **Tutor** for the course of Life Science (Lab2go project); Competition Announcement n. 2491/2018, University of Rome "La Sapienza", Faculty of Mathematical, Physic and Natural Sciences

*December 2017 – September 2018*: **Tutor** for the course of Life Science (Lab2go project); Competition Announcement n. 2535/2017, University of Rome "La Sapienza", Faculty of Mathematical, Physic and Natural Sciences

## RESEARCH FIELDS:

Most of my research work during my PhD has been focused on the study of the Hedgehog (Hh) signaling pathway regulation in the cerebellum development and at the same time I have also investigated how this signaling could be de-regulated in pathological and tumoral context. The Hh signaling pathway plays a crucial role in normal embryonic development and adult tissue homeostasis. The GLI proteins are considered the final effectors of this pathway, capable of regulating the transcription of target genes associated with proliferation and differentiation. It is well established in the literature that dysregulation of the Hh pathway is widely associated with pathological phenomena and tumorigenesis (as with medulloblastoma), mainly due to increased transcriptional activity of GLI1, the main transcriptional activator of the pathway.
During the years in Prof. Enrico De Smaele's laboratory I worked on the oncosuppressor KCASH2, a negative regulator of the Hh signaling, with both *in vitro* and *in vivo* approaches. As a matter of fact, I have participated to the publication of two different works concerning the transcriptional (**Angrisani et al., 2021**) and post-translational modulation of KCASH2 (**Di Fiore et al., 2023**). On the other hand, during my master internship, but also during my PhD, I have worked on the *in vivo* characterization of the cerebellar phenotype of the KCASH2$^{KO}$ mouse model. (**Izzo M. et al., Manuscript in preparation**).
However, the main project I worked on during my PhD is about the role of the two HECT-E3 Ubiquitin Ligases SMURF1 and SMURF2, such as negative regulators of GLI1 protein (**Bordin et al., Manuscript in preparation**). As a matter of fact, I found that both the SMURF proteins can interact directly with GLI1, leading to its ubiquitination and proteasomal degradation. Moreover, SMURFs overexpression in medulloblastoma cell lines can reduce their proliferation rate, by providing the GLI1 protein degradation. These new findings include SMURF proteins among the negative regulators of GLI1, increasing our knowledge to find new targets to exploit in the treatment of medulloblastoma and other tumors with increased GLI1 transcriptional activity.

## RESEARCH PROJECTS AND FUNDING:

- 2022: RESEARCH PROJECTS AIRC, Prot. IG29329: "*Dissecting new signaling pathways involved in Hh-dependent cancers for innovative targeted therapies and immunotherapies*". **Component of the research group; Project Leader Prof. Lucia Di Marcotullio**)

- 2022: RESEARCH PROJECTS OF RELEVANT NATIONAL INTEREST (PRIN), Prot. 2022XMHSYP: "*Novel approaches for the characterization and modulation of the oncogenic Sonic Hedgehog pathway in colorectal cancer.*" (**Component of the research group; Project Leader Prof. Enrico De Smaele**)

- 2022: RESEARCH PROJECTS OF RELEVANT NATIONAL INTEREST (PRIN) PNRR, Prot. P2022LZXNW: "*Simultaneous inhibition of multiple signaling transduction pathways by drugs combination in poor prognosis tumors*" (**Component of the research group; Project Leader Prof. Enrico De Smaele**)

- 2022: La Sapienza "University research starting grant", for the project: "*HECT-E3 Ubiquitin Ligase SMURF1 new role on the Hedgehog signaling pathway.*". (**Project Leader**)

- 2021: La Sapienza "University research starting grant" for the project: "*The role of the HECT-E3 Ubiquitin Ligase SMURF2 in the Hedgehog signaling pathway regulation.*". (**Project Leader**)

- 2021: La Sapienza "University major research projects grant", for the project: "*Defining the biological role of endocrine disruptors (ED) in breast cancer development and progression*". (**Component of the research group**; **Project Leader Prof. Elisabetta Ferretti**)

**CONFERENCES:**

1. 35th AICC ANNUAL CONFERENCE: From patient to cell and back. L'Aquila 2023, ITALY. Poster Presentation: "*Identification of SMURF proteins as negative regulators of the oncogenic Hedgehog/GLI1 pathway".*

2. EMBO Workshop Hedgehog signaling: From molecular structure to developmental biology and diseases. Sant Feliu de Guixols 2023, SPAIN. **Poster presentation:** 1) "*Identification of SMURF proteins as new Hedgehog pathway modulators.*"; 2) "*The KCASH2$^{KO}$ mouse: a new model to investigate the Hedgehog signaling in development and diseases.*"

3. EACR-OECI Joint Conference: Molecular Pathology Approach to Cancer. Bergamo 2023, ITALY. **Poster presentation**: "*Characterization of SMURFs proteins as new possible modulators of the Hedgehog Signaling Pathway.*"

4. MOLECULAR PATHOLOGY: FROM BENCH TO BEDSIDE-SIPMeT Young Scientist Meeting. Ancona 2022, ITALY. **Poster presentation**: "*Characterization of the HECT-E3 Ubiquitin Ligase SMURF1 as a new possible modulator of the Hedgehog signaling pathway.*"

5. MOLECULAR PATHOLOGY: FROM BENCH TO BEDSIDE-SIPMeT Young Scientist Meeting, Perugia 2021, ITALY. **Poster presentation**: "*New insights into the role of the HECT-E3 Ligase SMURF2 in the modulation of the Hedgehog Pathway.*"

6. 33rd AICC ANNUAL CONFERENCE: International meeting on cancer metabolism, Torino 2021. **Poster presentation**: "*HECT E3 Ligase SMURF2: a potential novel role in the modulation of the Hedgehog Pathway.*"

**PRIZES AND AWARDS:**

December 2023 – BEST POSTER PRESENTATION AWARD at the "35th AICC ANNUAL CONFERENCE: From patient to cell and back", L'Aquila, ITALY.

**PUBLICATIONS:**

1. Angrisani, A., Di Fiore, A., Di Trani, C. A., Fonte, S., Petroni, M., Lospinoso Severini, L., **Bordin, F.**, Belloni, L., Ferretti, E., Canettieri, G., Moretti, M., & De Smaele, E. (2021). Specific Protein 1 and p53 Interplay Modulates the Expression of the KCTD-Containing Cullin3 Adaptor Suppressor of Hedgehog 2. *Frontiers in cell and developmental biology*, *9*, 638508.https://doi.org/10.3389/fcell.2021.638508

2. Di Fiore, A., Bellardinelli, S., Pirone, L., Russo, R., Angrisani, A., Terriaca, G., Bowen, M., **Bordin, F.**, Besharat, Z. M., Canettieri, G., Fabretti, F., Di Gaetano, S., Di Marcotullio, L., Pedone, E., Moretti, M., & De Smaele, E. (2023). "KCTD1 is a new modulator of the KCASH family of Hedgehog suppressors". *Neoplasia* (New York, N.Y.), 43, 100926. https://doi.org/10.1016/j.neo.2023.100926

Il sottoscritto Fabio Bordin, ai sensi e per gli effetti degli articoli 46 e 47 e consapevole delle sanzioni penali previste dall'articolo 76 del D.P.R. 28 dicembre 2000, n. 445 nelle ipotesi di falsità in atti e dichiarazioni mendaci, dichiara che le informazioni riportate nel presente curriculum vitae corrispondono a verità

Rome, 21/01/2024

Fabio Bordin