Logo/names of your institution

University of Patras – Department of Medicine Group

ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΑΤΡΩΝ UNIVERSITY OF PATRAS	STem cell laboratory

Description of the group

The Stem Cell laboratory at the Department of Medicine, University of Patras, Greece led by Prof. Stavros Taraviras, was established in 2002 and currently consists of 12 researchers at different stages. The group focuses on elucidating how the fate of stem/progenitor cells towards commitment or differentiation is regulated by looking at mechanisms of cell cycle regulation, transcriptional control, and chromatin organization. Ultimately, the team studies how deregulation of these pathways lead to the development of cancer and neurodevelopmental diseases. The team specializes in the study of the involvement of the Geminin superfamily, a family that contains three genes (Geminin, GemC1 and McIdas) in the regulation of stem cell proliferation and differentiation, as the above genes are interacting with the mechanisms of DNA replication origin licensing, transcription factors and chromatin modifying complexes. The lab has developed unique tools such as conditional knock out mice, stem cell cultures and high-throughput approaches to understand the functions of the Geminin superfamily in the of regulation of stem and progenitor cells.

The team is well equipped for all basic molecular and cellular biology methodologies, and leads central facilities including an Advanced Light Microscopy unit, a Genomics Unit for next generation sequencing, a Flow Cytometry Unit, as well as animal facilities. Other equipment includes computer facilities, in vivo surgery equipment, viral preparation facility. The group has established a number of international collaborations and is part of several European, National and Overseas projects.

The personnel involved (or to be involved) in the project

Title/Name/Surname	**Email**	**Role**	**Reference Identifier**	**Type of Identifier**
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Infrastructure available

http://stemcellslab.upatras.gr/index.php/research/infrastructures

Stem Cells Laboratory

The Stem Cell Laboratory is located at the building of Basic Sciences Building of the Medical School occupying a space of more than 100m^2. The laboratory is equipped with all the necessary equipment to perform molecular and cellular biology research that includes:

- Gel electrophoresis and western blot systems, power supply, a Chemidoc MP Imaging system (Biorad)
- ELISA microplate reader
- Centrifuges, incubators, refrigerators, liquid nitrogen tanks, -80°C and -20°C freezers, and basic laboratory supplies
- Real time PCR machine
- Fully motorised Stereotaxic injector, in utero electroporator by Electron Square PoratorTM ECM830 by BTX® HARVARD APPARATUS with a Narishige PC-10 micropipette puller.
- Microtome for sectioning paraffin-embedded tissues, Leica cryostat, staining supplies
- Designated rooms equipped with biosafety level 2 laminar flow hoods and incubators for cell culture and viral production
- Computer Facilities
- Leica SP8 confocal microscope equipped with Lightning module for Super-resolution analysis
- Nikon TE2000 inverted microscope with camera
- Stereomicroscope with fluorescence (MZ16F, Leica) with a digital camera Leica DFV 300FX.
- Olympus IX83 inverted microscope frame with a fully automated xy motor stage, standard motorised controls (IX3-CBH) and z drift compensation (IR laser autofocus X3-ZDC-1-2) which contains a Hamamatsu Orca camera.

Central Facilities at the Medical School

Medical School Flow Cytometry and Fluorescence Activated Cell Sorting Research Facility:

- BD FACS Calibur
- BD FACS Accuri C6 Plus
- BD FACS Canto II

- BD FACS Aria III Cell Sorter

Medical School Genomic Research Facility:

- ScanArray Express (Perkin Elmer)
- Hybridizer HybArray12 (Perkin Elmer)
- Bioanalyser 2100 (Agilent)
- Ion Torrent Gene Studio S5 (Thermo Fisher Scientific)
- Ion Chef system (Thermo Fisher Scientific)
- Specific services include RNA-seq, single-cell RNA-seq, ChIP-seq, Exome-seq, Targeted-seq (custom capture or amplicon), RNA Expression (mRNA and miRNA), Genotyping (whole genome and custom), and Copy Number Variation. Data analysis services are available for all these technologies.

Medical School Advanced Live Cell Imaging Facilities:

- Leica SP5 confocal microscope with a clima-chamber including temperature and CO2 control, suitable for live cell imaging, FRAP and FRET analysis and functional biomolecule imaging software

Representative publications

1. Pefani DE, Dimaki M, Spella M, Karantzelis N, Mitsiki E, Kyrousi C, Symeonidou IE, Perrakis A, Taraviras S, Lygerou Z. *Idas, a novel phylogenetically conserved geminin-related protein, binds to geminin and is required for cell cycle progression.*
   J Biol Chem 286(26) **(2011).** https://doi.org/10.1074/jbc.M110.207688

2. Kyrousi C, Arbi M, Pilz GA, Pefani DE, Lalioti ME, Ninkovic J, Götz M, Lygerou Z, Taraviras S. *Mcidas and GemC1 are key regulators for the generation of multiciliated ependymal cells in the adult neurogenic niche*.
   Development 142(21) **(2015).** https://doi.org/10.1242/dev.126342

3. Champeris Tsaniras S, Villiou M, Giannou AD, Nikou S, Petropoulos M, Pateras IS, Tserou P, Karousi F, Lalioti ME, Gorgoulis VG, Patmanidi AL, Stathopoulos GT, Bravou V, Lygerou Z, Taraviras S. *Geminin ablation in vivo enhances tumorigenesis through increased genomic instability*.
   J Pathol. 246(2) **(2018).** https://doi.org/10.1002/path.6017

4. Lalioti ME, Arbi M, Loukas I, Kaplani K, Kalogeropoulou A, Lokka G, Kyrousi C, Mizi A, Georgomanolis T, Josipovic N, Gkikas D, Benes V, Politis PK, Papantonis A, Lygerou Z, Taraviras *S. GemC1 governs multiciliogenesis through direct interaction and transcriptional regulation of p73*.
   J Cell Sci*.* 132 (11) **(2019).** https://doi.org/10.1242/jcs.228684

5. Ortiz-Álvarez G, Daclin M, Shihavuddin A, Lansade P, Fortoul A, Faucourt M, Clavreul S, Lalioti ME, Taraviras S, Hippenmeyer S, Livet J, Meunier A, Genovesio A, Spassky N*. Adult Neural Stem Cells and Multiciliated Ependymal Cells Share a Common Lineage Regulated by the Geminin Family Members.*
   Neuron*.* 102(1) **(2019).** https://doi.org/10.1016/j.neuron.2019.01.051

6. Lalioti ME, Kaplani K, Lokka G, Georgomanolis T, Kyrousi C, Dong W, Dunbar A, Parlapani E, Damianidou E, Spassky N, Kahle KT, Papantonis A, Lygerou Z, Taraviras S. *GemC1 is a critical switch for neural stem cell generation in the postnatal brain*.
Glia. 67(12) **(2019).** https://doi.org/10.1002/glia.23690

7. Landskron L, Bak J, Adamopoulos A, Kaplani K, Moraiti M, van den Hengel LG, Song JY, Bleijerveld OB, Nieuwenhuis J, Heidebrecht T, Henneman L, Moutin MJ, Barisic M, Taraviras S, Perrakis A, Brummelkamp TR. *Posttranslational modification of microtubules by the MATCAP detyrosinase*.
Science. 376(6595) **(2022).** https://doi.org/10.1126/science.abn6020

8. Kalogeropoulou A, Mougkogianni M, Iliadou M, Nikolopoulou E, Flordelis S, Kanellou A, Arbi M, Nikou S, Nieminuszczy J, Niedzwiedz W, Kardamakis D, Bravou V, Lygerou Z, Taraviras S. *Intrinsic neural stem cell properties define brain hypersensitivity to genotoxic stress.*
Stem Cell Reports. 17(6) **(2022).** https://doi.org/10.1016/j.stemcr.2022.04.018

9. Petropoulos M, Champeris Tsaniras S, Nikou S, Maxouri S, Dionellis VS, Kalogeropoulou A, Karamichali A, Ioannidis K, Danalatos IR, Obst M, Naumann R, Delinasios GJ, Gorgoulis VG, Roukos V, Anastassiadis K, Halazonetis TD, Bravou V, Lygerou Z, Taraviras S. *Cdt1 overexpression drives colorectal carcinogenesis through origin overlicensing and DNA damage*.
J Pathol. 259(1) **(2023).** https://doi.org/10.1002/path.6017