

PERSONAL INFORMATION



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Date of birth: 17/08/1978

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PhD award date: 23/06/2008

SUMMARY

Dr. Vassilis Roukos is an Assistant Professor of Biology at the Department of Medicine, University of Patras. He is a graduate of the Department of Biology of the University of Patras, holds a Master's degree and a PhD in Molecular Biology and Cytogenetics from the Department of Medicine of the University of Patras. From 2008 to 2015, he has served as a *Postdoctoral Researcher at the National Cancer Institute (NCI) of the National Institutes of Health (NIH)*, USA and from 2015 to 2022 as a principal investigator of a research team at the *Institute of Molecular Biology, Mainz, Germany*. His laboratory has participated in large research initiatives attracting high external funding. He has more than 35 publications in high impact journals such as *Nature, Science, Nature Biotechnology, Nature Cell Biology, Mol Cell, Nature Rev Mol Cell Biol, Nature Prot, Nature Com, Science Adv. etc.* and has filed applications for *European and International patents*. He has served as an external reviewer for many prestigious journals and granting bodies, co-organized international conferences (e.g. EMBO) and has been invited to highlight published studies to a wider scientific audience for journals such as *Nature, Nature Rev Mol Cell Biol and EMBO J*. His research focuses on the study of cellular mechanisms that maintain genomic stability, human 3D genome organization and genome editing (CRISPR/Cas9). His laboratory uses, amongst others, next-generation, high-throughput imaging and sequencing methodologies.

EDUCATION

- 1998-2002: **Bachelor in Biology**: Department of Biology, University of Patras, Greece.
- 2001-2002: Diploma Research, Medical School, University of Patras, Greece
- 2002-2005: **Masters**: University of Patras, Greece, Supervisor: Zoi Lygerou, Project: *"Regulation of the cell cycle proteins, Cdt1 and Geminin during apoptosis"*.
- 2005-2008: **PhD**: Medical School, University of Patras, Greece, Supervisor: Zoi Lygerou. Project: *"Regulation of the cell cycle proteins, Cdt1 and Geminin, in DNA-damaged and apoptotic cells"*.
- 2005-2006: **Visiting PhD** student at European Molecular Biology Laboratory (EMBL), Heidelberg, Germany. Laboratory of Dr. Philippe Bastiaens, Cell Biology and Biophysics. Research focused on *"Regulation of licensing factor Cdt1 using advanced microscopy techniques"*.

POSTDOCTORAL RESEARCH

- 2008-2013: **NIH Postdoctoral Fellow**; National Cancer Institute, NIH, USA. Laboratory of Dr. Tom Misteli, Cell Biology of Genomes group. Research focused on *"Mechanisms regulating the formation of chromosome translocations"*.
- 2013-2015: **NIH Research Fellow**; National Cancer Institute, NIH, USA. Group of Dr. Tom

Misteli. Research focused on “*Cellular mechanisms maintaining genome integrity*”.

PRINCIPAL INVESTIGATOR POSITIONS

2015-2022: **Group leader** at the Institute of Molecular Biology (IMB), Mainz, Germany.
2022-onwards: **Assistant Professor**, Medical School, University of Patras, Greece

FELLOWSHIPS AND AWARDS

2001 Scholarship from the Greek State Scholarship Foundation (IKY)
2005 Short-term fellowship from the European Molecular Biology Organisation
2005 Short-term fellowship from the Federation of European Biochemistry Society
2012 NIH Special Service Group Award for the new HiTIF technology
2008-2013 Postdoctoral Fellowship Award, National Cancer Institute, NIH
2013 Fellows Award for Research Excellence, NIH

SUPERVISION OF STUDENTS

2015 onwards Direct Supervision of 7 PhD students (5 graduated), co-supervision of 2 PhD students, 3 PostDocs, 5 Master student, 3 Bachelor students, 5 Summer students, 1 Visiting PhD student and 1 visiting PostDoc
2015 onwards Participation in the Thesis Advisory Committee (TAC) of >30 students (6 as direct supervisor, 20 as part of the International PhD program and 4 from Institutes/Universities abroad).

OTHER RESEARCH ACTIVITIES

2021 Co-organization of the (2021) EMBO workshop “*DNA Topology in Genomic Transactions*”.
2019 Co-organization of the IMB Conference “*Chromosome Territories and Nuclear Architecture*”, held in Mainz, Germany, Oct 30th-1st of Nov.
2015 onwards *Ad hoc* referee for grants: ERC, German Research Foundation (DFG), Wellcome Trust, US-Israel Binational Science Foundation, ANR, France, University of Cyprus HFRI/ELIDEK etc.
2015 onwards Referee for peer reviewed journals: *Nature*, *Nature Cell Biology*, *Science Advances*, *Mol Cell*, *Nature Commun*, *Journal of Cell Biology*, *EMBO J*, *Nucleic Acid Research*, *Journal of Molecular Biology*, *Epigenetics* etc.
2015 onwards *Advisory board* member for IMB

PUBLICATIONS

1. Gabriel N. C. Longo*, Sergi Sayols*, **Vassilis Roukos**. Multi-level characterization of genome editor’s nuclease activity with BreakTag. (2025) *Nat Protoc*, *in press*
2. Gabriel M. C. Longo*, Sergi Sayols*, Andriana G. Kotini, Sabine Heinen, Martin M. Mockel, Petra Beli, **Vassilis Roukos**. Linking CRISPR/Cas9 double-strand break profiles to gene editing precision with BreakTag. (2025) *Nat Biotech*. Apr;43(4):608-622. doi: 10.1038/s41587-024-02238-8. Epub 2024 May 13.

3. Longo GMC*, Sayols S*, Stefanova ME*, Xie T*, Elsayed W*, Panagi A, Stavridou AI, Petrosino G, Ing-Simmons E, Melo US, Gothe HJ, Vaquerizas JM, Kotini AG, Papantonis A[#], Mundlos S[#], **Roukos V[#]**. (2024) *Mol Cell* Nov 21;84(22):4267-4281.e8. doi: 10.1016/j.molcel.2024.10.007. Epub 2024 Oct 31.
4. Ning Zhang, Luuk Harbers, Michele Simonetti, Constantin Diekmann, Quentin Verron, Enrico Berrino, Sara E. Bellomo, Gabriel M.C. Longo , Michael Ratz, Niklas Schultz, Firas Tarish, Peng Su, Bo Han, Wanzhong Wang, Sofia Onorato, Dora Grassini, Roberto Ballarino, Silvia Giordano, Qifeng Yang , Anna Sapino, Jonas Frisén, Kanar Alkass, Henrik Druid, **Vassilis Roukos**, Thomas Helleday, Caterina Marchiò, Magda Bienko, Nicola Crosetto (2024) High clonal diversity and spatial genetic admixture in early prostate cancer and surrounding normal tissue *Nat Commun.* 15, 3475. DOI: <https://doi.org/10.1038/s41467-024-47664-z>
5. Mosler T, Baymaz HI, Gräf JF, Mikicic I, Blattner G, Bartlett E, Ostermaier M, Piccinno R, Yang J, Voigt A, Gatti M, Pellegrino S, Altmeyer M, Luck K, Ahel I, **Roukos V**, Beli P. PARP1 proximity proteomics reveals interaction partners at stressed replication forks. *Nucleic Acids Res.* 2022 Nov 11;50(20):11600-11618. doi: 10.1093/nar/gkac948
6. 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. *J Pathol.* 2023 Jan;259(1):10-20. doi: 10.1002/path.6017. Epub 2022 Nov 9.
7. Tsaridou S, Velimezi G, Willenbrock F, Chatzifrangkeskou M, Elsayed W, Panagopoulos A, Karamitros D, Gorgoulis V, Lygerou Z, **Roukos V**, O'Neill E[#] and Pefani DE[#]. 53BP1-mediated recruitment of RASSF1A to ribosomal DNA breaks promotes local ATM signaling. *EMBO Rep*, 2022, 23:e544833
8. Abu-Libdeh B, Jhujh SS, Dhar S, Sommers JA, Datta A, Longo GM, Grange LJ, Reynolds JJ, Cooke SL, McNee GS, Hollingworth R, Woodward BL, Ganesh AN, Smerdon SJ, Nicolae CM, Durlacher-Betzer K, Molho-Pessach V, Abu-Libdeh A, Meiner V, Moldovan GL, **Roukos V**, Harel T, Brosh RM Jr, Stewart GS. RECON syndrome is a genome instability disorder caused by mutations in the DNA helicase RECQL1. *J Clin Invest.* 2022, Mar 1;132(5):e147301.
9. R-loop proximity proteomics identifies a role of DDX41 in transcription-associated genomic instability. Mosler T, Conte F, Longo GMC, Mikicic I, Kreim N, Möckel MM, Petrosino G, Flach J, Barau J, Luke B, Roukos V, Beli P. *Nat Commun.* 2021, Dec 16;12(1):7314
10. Papantonis A and **Roukos V** Cohesin puts a break on distal homology hunt. *Nat Cell Biol.* 2021 Nov;23(11):1112-1114.
11. Longo GMC and **Roukos V** Territories or spaghetti? Chromosome organization exposed. *Nat Rev Mol Cell Biol.* 2021 Apr 14.
12. Zhang S, Übelmesser N, Josipovic N, Forte G , Slotman JA, Chiang M , Gothe HJ, Gusmao EG, Becker C, Altmüller A, Houtsmuller AB, **Roukos V**, Wendt KS, Marenduzzo D, Papantonis A. (2021) RNA polymerase II is required for spatial chromatin reorganization following exit from mitosis. *Science Advances*, Oct 22;7(43):eabg8205.
13. Bouwman BAM, Agostini F, Garnerone S, Petrosino G, Gothe HJ, Sayols S, Moor AE, Itzkovitz S, Bienko M, **Roukos V** and Crosetto N (2020) Genome-wide detection of DNA double-strand breaks by in-suspension BLISS. *Nat Protoc*, 15:3894–3941
14. Gothe HJ, Bouwman BAM*, Gusmao EG*, Piccinno R, Petrosino G, Sayols S, Drechsel O, Minneker V, Josipovic N, Mizi A, Nielsen CF, Wagner EM, Takeda S, Sasanuma H, Hudson DF, Kindler T, Baranello L, Papantonis A*, Crosetto N* and **Roukos V**. Spatial

- chromosome folding and active transcription drive DNA fragility and formation of oncogenic MLL translocations. *Mol Cell*, 2019 75:267-283.e12
15. Lucic B*, Chen HC*, Kuzman M*, Zorita *E, Wegner J, Minneker V, Wang W, Fronza R, Laufs S, Schmidt M, Stadhouders R, **Roukos V**, Vlahovicek K#, Filion GJ# and Lusic M# Spatially clustered loci with multiple enhancers are frequent targets of HIV-1 integration. *Nat Commun*, 2019, 10:4059
 16. Piccinno R*, Minneker V* and **Roukos V** 53BP1—DNA repair enters a new liquid phase. *EMBO J*, 2019 38:e102871
 17. Gothe HJ, Minneker V and **Roukos V** Dynamics of double-strand breaks: Implications for the formation of chromosome translocations. Pages 27–38 in: Chromosome Translocation; *Advances in Experimental Medicine and Biology*, 2018, vol. 1044 (ed. Zhang Y), Springer, Singapore
 18. **Roukos V** (2018) Actin proteins assemble to protect the genome. *Nature*, 559:35–37
 19. Dörsam B, Seiwert N, Foersch S, Stroh S, Nagel G, Begaliew D, Diehl E, Kraus A, McKeague M, Minneker V, **Roukos V**, Reißig S, Waisman A, Moehler M, Stier A, Mangerich A, Dantzer F, Kaina B and Fahrner J (2018) PARP-1 protects against colorectal tumor induction, but promotes inflammation-driven colorectal tumor progression. *Proc Natl Acad Sci USA*, 115:E4061–E4070
 20. Zirkel A, Nikolic M, Sofiadis K, Mallm JP, Brackley CA, Gothe H, Drechsel O, Becker C, Altmüller J, Josipovic N, Georgomanolis T, Brant L, Franzen J, Koker M, Gusmao EG, Costa IG, Ullrich RT, Wagner W, **Roukos V**, Nürnberg P, Marenduzzo D, Rippe K and Papantonis A. HMGB2 loss upon senescence entry disrupts genomic organization and induces CTCF clustering across cell types. *Mol Cell*, 2018, 70:730–744.e6
 21. **Roukos V**#, Pegoraro G, Voss TC and Misteli T# Cell cycle staging of individual cells by fluorescence microscopy. *Nat Protoc*, 2015, 10:334–348
 22. **Roukos V**#, Burgess RC and Misteli T# Generation of cell-based systems to visualize chromosome damage and translocations in living cells. *Nat Protoc*, 2014, 9:2476–2492
 23. **Roukos V**, Voss TC, Schmidt CK, Lee S, Wangsa D and Misteli T. Spatial dynamics of chromosome translocations in living cells. *Science*, 2013, 341:660–664
 24. Dittmer TA, Sahni N, Kubben N, Hill DE, Vidal M, Burgess RC, **Roukos V** and Misteli T (2014) Systematic identification of pathological Lamin A interactors. *Mol Biol Cell*, 25:1493–1510
 25. Piccinno R, Cipinska M and **Roukos V**. Studies of the DNA damage response by using the Lac operator/repressor (LacO/LacR) tethering system. Pages 263–275 in: ATM Kinase; *Methods in Molecular Biology*, 2017 vol. 1599 (ed. Kozlov S V), Humana Press, New York
 26. **Roukos V** and Mathas S The origins of ALK translocations. *Front Biosci*, 2015, 7:260–268
 27. **Roukos V**# and Misteli T#. The biogenesis of chromosome translocations. *Nat Cell Biol*, 16:293–300
 28. **Roukos V** and Misteli T. Deep Imaging: The next frontier in microscopy. *Histochem Cell Biol*, 2014, 142:125–131
 29. **Roukos V**, Burman B and Misteli T. The cellular etiology of chromosome translocations. *Curr Opin Cell Biol*, 2013, 25:357–364
 30. Symeonidou IE, Kotsantis P, **Roukos V**, Rapsomaniki MA, Grecco HE, Bastiaens P, Taraviras S and Lygerou Z. Multi-step loading of human minichromosome maintenance proteins in live human cells. *J Biol Chem*, 2013, 288:35852–35867

31. Haj FG, Sabet O, Kinkhabwala A, Wimmer-Kleikamp S, **Roukos V**, Han HM, Grabenbauer M, Bierbaum M, Antony C, Neel BG and Bastiaens PI. Regulation of signaling at regions of cell-cell contact by endoplasmic reticulum-bound protein-tyrosine phosphatase 1B. *PLOS One*, 2012, 7:e36633
32. Stathopoulou A, **Roukos V**, Petropoulou C, Kotsantis P, Karantzelis N, Nishitani H, Lygerou Z and Taraviras S. Cdt1 is differentially targeted for degradation by anticancer chemotherapeutic drugs. *PLOS One*, 2012, 7:e34621
33. **Roukos V**, Kinkhabwala A, Colombelli J, Kotsantis P, Taraviras S, Nishitani H, Stelzer E, Bastiaens P, Lygerou Z. Dynamic recruitment of licensing factor Cdt1 to sites of DNA damage. *J Cell Sci* 2011, 124, 422-34.
34. Vidi P, Chandramouly G, Gray M, Wang L, Liu E, Kim JJ, **Roukos V**, Bissell MJ, Moghe P V and Lelievre SA. Interconnected contribution of tissue morphogenesis and the nuclear protein NuMA to the DNA damage response. *J Cell Sci*, 2012, 125:350–361
35. **Roukos V**, Misteli T and Schmidt CK. Descriptive no more: The dawn of high-throughput microscopy. *Trends Cell Biol*, 2010, 20:503–506
36. Cinquemani, E., **Roukos, V.**, Lygerou, Z., Lygeros, J. Numerical analysis of FRAP experiments for DNA replication and repair. *IEEE Conference on Decision and Control*, 2008, 9-11 Dec. 0191-2216
37. **Roukos, V.**, Iliou, M.S., Nishitani, H., Gentzel, M., Wilm, M., Taraviras, S. and Lygerou, Z. Geminin cleavage during apoptosis by caspase-3 alters its binding ability to the SWI/SNF subunit Brahma. *J Biol Chem*, 2007, 282, 9346-9357, 2007
38. Nishitani H, Sugimoto N, **Roukos V**, Nakanishi Y, Saijo M, Obuse C, Tsurimoto T, Nakayama KI, Nakayama K, Fujita M, Lygerou Z and Nishimoto T. Two E3 ubiquitin ligases, SCF-Skp2 and DDB1-Cul4, target human Cdt1 for proteolysis. *EMBO J*, 2006, 25:1126–1136

(*indicates joint contribution, #indicates shared correspondence)

PATENT APPLICATIONS

2022 Method of parallel, rapid, and sensitive detection of DNA double-strand breaks:
 WO2024033378A1 (<https://patents.google.com/patent/WO2024033378A1/en>)

SELECTED PRESENTATIONS

- Invited presentation at the kick-off meeting MILESTONE (University of Patras, Greece)
- Invited presentation at the Master and PhD student meeting at the Biology Department, University of Patras
- EMBO workshop, “DNA topology in genomic transactions”, 2021 (virtual)
- EMBO workshop “Chromatin dynamics and nuclear organization in genome maintenance”, December 7-11, 2020
- SPP 2202 kick-off meeting; “The role of chromosome genome organization in chromosome fragility and the formation of leukemia driving translocations”; June 2019; Berlin, Germany

- Invited seminar, Karolinska Institutet; “Breaking Bad: how breaks in folded, active DNA promote oncogenic translocations in response to cancer therapy”; December 2019, Stockholm, Sweden
- EMBO workshop, “DNA topology and Topoisomerases in Genome Dynamics”, 2019, Les Diablerets, Switzerland
- EMBO workshop, “The Genome in Three Dimensions”, 2019, Kyllini, Greece
- Workshop: “DNA repair, Cancer and Regeneration”, 2018, Bologna, Italy
- EMBO workshop, “RNA and Genome Maintenance: Cooperation and Conflict Management”, 2018, Mainz, Germany,
- EMBO meeting, “Chromatin dynamics and nuclear organization of the genome”, 2018, Strasbourg, France,
- Meeting of the “German Society for Research in DNA Repair”, 2016, Essen, Germany
- Research Training Group, University Klinikum; “Insights into biogenesis of chromosome translocations”; 2016, Essen, Germany
- EMBO meeting in “Nuclear function and cell fate choice”, 2016, Kyllini, Greece
- School of Cancer Sciences; “The biogenesis of chromosome translocations”; 2015, University of Birmingham, UK
- Chromothripsis, Clustered Mutation and Complex Chromosome Rearrangements, Spatial dynamics of chromosome translocations in living cells; 2014, Cambridge, MA, USA
- 20th International Chromosome Conference, “Biogenesis of chromosome translocations” 2014, University of Kent, Canterbury, UK
- Max F. Perutz Laboratories, Spatial dynamics of chromosome translocations in living cells; 2014, Vienna, Austria
- Feinberg School of Medicine, Northwestern University, Spatial dynamics of chromosome translocations in living cells; 2014, Chicago, USA
- MRC Clinical Sciences Center, Dynamics of chromosome translocations in living cells; 2014, London, UK
- Laboratory of Genome Integrity, NCI, NIH, Spatial dynamics of chromosome translocations in living cells; 2013, Bethesda, USA
- Cold Spring Harbor Laboratory, “Dynamic Organization of Nuclear Function”, 2012, New York, USA

BIBLIOGRAPHY (*ALL*).

<https://pubmed.ncbi.nlm.nih.gov/?term=roukos+v&sort=date&size=50>