Pierre-Francois Roux

Epigeneticist & in silico biologist | PhD in Genetics and Genomics | Qualified in CNU sections 64 and 65
IRCM - Inserm U1194, Molecular Oncogenesis, Montpellier, France
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RESEARCH PROFILE

I study how metabolic states shape gene regulation, chromatin organization and cell fate decisions in aging, cancer and skin biology. My work combines experimental molecular biology, functional genomics, multi-omics integration, bioinformatics, systems biology and machine-learning approaches. My current research focuses on p53/E4F1-mediated metabolic-epigenetic coupling during senescence and on ATAC-seq-derived signatures of aging, frailty and tumor evolution.

PROFESSIONAL EXPERIENCE

2021-present Research Scientist, Molecular Oncogenesis, IRCM - Inserm U1194, Montpellier.
PI: Dr Laurent Le Cam. Ex vivo and in vitro analysis of p53-dependent epigenetic and metabolic reprogramming during senescence and aging, with emphasis on E4F1-mediated regulation of acetyl-CoA synthesis, chromatin remodeling and senescence programs. Approaches include ATAC-seq, CUT&RUN, RNA-seq, metabolomics, cell models and in vivo aging models.

2019-2021 Research Scientist, Upstream Skin Research & Innovation, Johnson & Johnson, Val-de-Reuil.
PIs: Dr Georgios Stamatas and Dr Thierry Oddos. Pre-clinical and clinical skin biology research based on multi-omics cohorts, integrating microbiome, metabolome, transcriptome and phenome data to study skin maturation, barrier function, inflammatory risk and translational biomarkers.

2015-2019 Postdoctoral Researcher, Nuclear Organization and Oncogenesis, Institut Pasteur / Inserm U993, Paris.
PIs: Dr Anne Dejean and Dr Oliver Bischof. Multidimensional and temporal profiling of transcriptome and epigenome organization during cellular senescence in human fibroblasts exposed to distinct stresses and environments, using ATAC-seq, ChIP-seq, transcriptomics, metabolomics, proteomics and network inference.

2011-2014 PhD, Genetics and Genomics, INRAe - Institut Agro 1348 PEGASE, Rennes.
PIs: Prof Sandrine Lagarrigue and Dr Olivier Demeure. Detection of genome-scale single nucleotide polymorphisms for genetic dissection of complex traits and characterization of editomes, combining RNA-seq, whole-genome resequencing, QTL fine mapping, cis-eQTL analysis and variant annotation.

2010 MEng trainee, IRSET, Rennes.
PI: Dr Corine Martin-Chouly. Characterization of lipid metabolism, lipidome and cytokine responses in primary macrophages from patients with cystic fibrosis during inflammatory and infectious contexts.

2009 MSc trainee, UQAM BioMed, Montreal.
PIs: Prof Catherine Mounier and Dr Daniel Mauvoisin. Study of the role of Stearoyl-CoA Desaturase 1 in adipocyte maturation using stable knock-down in murine pre-adipocytes.

EDUCATION AND TRAINING

- 2022 Animal experimentation training, designer level, BioCampus Montpellier.
- 2014 PhD in Genetics and Genomics, Institut Agro Rennes-Angers.
- 2011 MEng in Agronomical Science, Institut Agro Rennes-Angers.
- 2011 MSc in Cell and Molecular Biology, Universite Rennes 1.
- 2009 MSc in Marine Biology and Biological Oceanography, Universite Lille 1.
- 2008 BSc in Biology of Organisms and Populations, Universite Lille.
- 2004-2006 French CPGE BCPST-Veto, Lycee Albert Chatelet.

RESEARCH CONTRIBUTIONS

- p53/E4F1, metabolism and senescence: investigated how E4F1 connects p53/pRB signaling, pyruvate metabolism, acetyl-CoA production and chromatin regulation during senescence.
- ATAC-seq as an integrative assay: established bulk ATAC-seq as a dual genetic and epigenetic platform capturing chromatin accessibility, variants, CNVs, mitochondrial features and telomere-associated signals.
- Systems view of senescence: developed temporal multi-omic analyses identifying enhancer

remodeling and AP-1-centered regulatory circuits as key determinants of oncogene-induced senescence.

- Skin microbiome and metabolome: integrated microbiome and metabolome profiles to identify microbe-metabolite clusters relevant to skin physiology and early-life skin maturation.

- Quantitative genetics: combined QTL mapping, WGS, selection signatures, variant annotation and eQTL analyses to prioritize causal genes for adiposity and energy metabolism.

- RNA editing: developed stringent WGS/RNA-seq strategies to distinguish genuine RNA editing events from sequencing and mapping artifacts.

PUBLICATIONS AND VALORIZATION

- 24 original research articles, including 7 first or co-first author publications and 1 last/corresponding author publication.

- 2 review articles, 1 didactic article, 1 radio communication and 4 patents.

- Major journals include NAR Genomics and Bioinformatics, Nature Communications, Nature Aging, Journal of Investigative Dermatology, Nature Cell Biology, Nature, Cell and Cell Genomics.

SELECTED PUBLICATIONS

- Toumi I., Kham C., Stuani L., Le Cam L., Roux P.F. Beyond chromatin accessibility: bulk ATAC-seq as an integrative assay to portray genomes and epigenomes. NAR Genomics and Bioinformatics, 2026. Last and corresponding author.

- Di Michele M., Attina A., Roux P.F. et al. E4F1 coordinates pyruvate metabolism and the activity of the elongator complex to ensure translation fidelity during brain development. Nature Communications, 2025. Co-second author.

- Guerrero A. et al. 3-Deazaadenosine alleviates senescence to promote cellular fitness and cell therapy efficiency in mice. Nature Aging, 2022.

- Roux P.F., Oddos T., Stamatas G. Deciphering the role of skin surface microbiome on skin health: an integrative multi-omics approach reveals three microbial/metabolic clusters. Journal of Investigative Dermatology, 2021. First author.

- Martinez-Zamudio R.I., Roux P.F. et al. AP-1 imprints a reversible transcriptional programme of senescent cells. Nature Cell Biology, 2020. Co-first author.

- Heinzmann F. et al. Necroptosis microenvironment determines lineage commitment in liver cancer. Nature, 2018.

- Martinez-Zamudio R.I., Robinson L., Roux P.F., Bischof O. Snapshot: cellular senescence pathways / in pathophysiology. Cell, 2017.

- Roux P.F. et al. Combined QTL and selective sweep mappings with coding SNP annotation and cis-eQTL analysis revealed PARK2 and JAG2 as candidate genes for adiposity regulation. G3, 2015. First author.

FUNDING

- Submitted: ANR 2026 project on metabolism-epigenome interactions during cellular senescence and aging.

- Submitted: Canceropole Grand Sud-Ouest 2026 project on integrative tumor profiling by ATAC-seq for actionable signatures.

- Acquired: ANR 2019 S-ENCODE project on deciphering the senescence code to improve healthy lifespan.

TEACHING

- Since 2025 - SIRIC Montpellier Cancer: "Unlocking epigenomic insights: ATAC-seq data analysis in practice", practical training for cancer researchers and clinicians.

- Since 2021 - Universite de Montpellier: molecular basis of cellular senescence and aging; Master 2 Biology-Health students; lecture.

- Institut Agro Rennes-Angers / Agrocampus Ouest: ChIP-seq and ATAC-seq data analysis with UNIX and Bioconductor; RNA-seq processing with a reference genome; continuing education, lectures and practical work.

- Institut Agro Rennes-Angers / Agrocampus Ouest: methodologies for molecular and cell biology; high-throughput technologies for studying living systems; bioinformatics; MEng students, lectures and practical work.

- Universite Paris Diderot: epigenomics for cancer research and clinic; MD students, MSc students and health professionals.

- 2012 - Universite Rennes 1: probing the transcriptome with microarrays; Master 1 Cell and Molecular Biology students; lecture and practical work.

SUPERVISION AND TRAINING

- Co-supervision of 1 PhD student on aging, cellular senescence and metabolic adaptability.
- Supervision of 7 Master 2 internships in bioinformatics, epigenomics, cancer biology and structural genomics.
- Supervision of 2 Master 1 internships in molecular and cellular biology.
- Member of a PhD thesis committee.

SCIENTIFIC ANIMATION, RESPONSIBILITIES AND SERVICE

- Invited seminars on senescence systems biology and metabolic reprogramming at TOXALIM, IRCM and the London Institute of Medical Science - Imperial College.
- Talks at international meetings including the International Cell Senescence Association, Plant and Animal Genetics, European Federation of Animal Science and European Symposium on Poultry Genetics.
- Poster communications at Euro Geroscience, International Cell Senescence Association, AVIESAN modeling workshop, American Society of Human Genetics and European Federation of Animal Science.
- Participation in conference organization, scientific events and collaborative research networks.
- Editorial and peer-review activities for scientific journals.
- Involvement in professional equality and mentoring actions, including Femmes & Sciences mentoring.

PATENTS

- 2022 Biomarkers predictive of atopic dermatitis, JCO6146USPSP1, pending.
- 2021 Use of microbiome and metabolome clusters to evaluate skin health, US20220142560A1, published.
- 2021 Use of biomarkers to evaluate the efficacy of a composition reducing the effects of cancer therapeutics on skin, US20220057383A1, published.
- 2021 Non-invasive method to evaluate surface skin miRNome and transcriptome, EP21306470.2.

TECHNICAL SKILLS

Epigenomics; genomics; genetics; aging; cellular senescence; cancer biology; skin biology; systems biology; RNA-seq; ATAC-seq; CUT&RUN; ChIP-seq; MNase-seq; WGS; QTL mapping; cis-eQTL; metabolomics; microbiome profiling; UNIX; R/Bioconductor; reproducible workflows; multi-omics integration; network inference; dimensionality reduction; feature selection; machine learning; cell culture; primary cells; bench work; in vivo mouse models.

LANGUAGES

French: native. English: fluent.