



Master Biologie Moléculaire et Cellulaire 'BMC',
Université Paris Cité - UFR Sciences du Vivant

Parcours : **Biologie et Développement Cellulaires 'BDC'**

<http://www.master2bdc.fr/>

Fiche de Projet de Stage de M2, 2024-2025

<p>Unité INSERM ou CNRS ou Université : Inserm u1016 – CNRS UMR8104 – Université Paris Cité</p> <p>Intitulé Equipe : From Gametes to Birth</p> <p>ED d'appartenance : BioSPC</p> <p>Responsable de l'Equipe : Daniel VAIMAN</p>	<p>Responsable du Stage : Julie COCQUET</p> <p>Contacts</p> <p>Adresse : Institut Cochin – 24 rue du Faubourg St Jacques, Paris 14^{ème}</p> <p>Email : julie.cocquet@inserm.fr</p> <p>Tel : 01 44 41 23 10</p> <p>X : @JulieCocquet</p> <p>https://institutcochin.fr/en/research-project/epigenetic-regulation-during-spermatogenesis</p>
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Titre du projet : (Epi)genetic regulation of male gametes

Résumé du Projet de Stage (en 300 mots maximum, mots clés en gras)

Approximately one in ten men suffers from **infertility** most often resulting from an abnormal spermatogenesis. The cause, whether genetic or environmental, remains often unknown, with ~50% of male infertility defined as 'idiopathic'. **Spermatogenesis** is a fascinating multi-step cell differentiation process associated with a highly dynamic genetic program and extensive chromatin changes. Our group studies **spermatogenesis at the gene and the chromatin levels** to identify and characterize key regulators of male germ cell (epi)genetic program and thus better understand the causes of male fertility.

Our project also aims at studying **male gamete epigenome** in health and disease. Indeed, a growing body of evidence suggests that environmental exposures or 'lifestyles' (such as toxic exposure or a high-fat diet) can modify the epigenetic information carried by male gametes. These information may be transmitted to embryos and alter the development and health of offspring. A better characterization of the molecular mechanisms controlling the establishment of paternal gamete epigenome is therefore crucial.

The proposed M2 research project will consist in studying **mouse models** with abnormal spermatogenesis, resulting from a knockout of the **epigenetic regulators** we are investigating. Mouse models of **environmental exposure** will also be studied. The M2 student will characterize the functional and molecular consequences of the genetic/environment-induced defects on male gametes throughout their differentiation. Experiments include: CUT&Tag/ChIP-Seq, snRNA-Seq, IP-mass spectrometry, cell sorting, immunofluorescences and Western blots.

The M2 student will be trained in state-of-the-art techniques in molecular and cellular biology, including (epi)genomic analyses by members of the host group. He/she will also benefit from the scientifically dynamic environment of the host team and of the Institut Cochin.

Publications de l'équipe relatives au projet de stage (max 5)

- Blanco et al. (2023) DOT1L regulates chromatin reorganization and gene expression during sperm differentiation. *EMBO Rep.* 2023 doi: 10.15252/embr.202256316. PMID: 37099396
- Gobé et al. (2023) Generation and Characterization of a Transgenic Mouse That Specifically Expresses the Cre Recombinase in Spermatids. *Genes.* doi: 10.3390/genes14050983. PMID: 37239343
- Blanco M, **Cocquet J*** (2019) Genetic Factors Affecting Sperm Chromatin Structure. *Adv Exp Med Biol.* doi: 10.1007/978-3-030-21664-1_1. PMID: 31301043
- Champroux A, **Cocquet J***, Henry-Berger J, Drevet JR, Kocer A* (2018) A Decade of Exploring the Mammalian Sperm Epigenome: Paternal Epigenetic and Transgenerational Inheritance. *Front Cell Dev Biol.* doi: 10.3389/fcell.2018.00050. PMID: 29868581