

Master Student in the Laboratory of Prof. Rabih Murr - CMU/UNIGE

We are looking for ambitious and highly motivated biology master students. The Murr laboratory is part of the Department of Genetic Medicine and Development (GEDEV), Faculty of Medicine, University of Geneva.

The laboratory is studying the crosstalk between genetic and epigenetic mechanisms in the regulation of gene expression in health and disease.

DNA methylation is an essential epigenetic modification that was hypothesized to repress transcription by directly blocking transcription factor (TF) binding. Remarkably, we have shown that some TFs, which we suggest to name "demethylating TFs (DFs)", are not only able to bind to their methylated motifs, but can also induce DNA demethylation. This original observation constitutes the basis of the research projects in my laboratory. Whether other TFs have a demethylating activity is not known. Likewise, it is not known what makes DNA methylation a determinant factor in TF binding and transcription regulation in some cases and a secondary effect in other cases. We aim at methodically determining the interdependence between TF binding and DNA methylation. We plan to identify all DFs and define the mechanisms of DNA demethylation at their binding sites. Results will allow setting the rules governing TF sensitivity to, and effect on, DNA methylation and defining the order of events during transcription regulation. Finally, we propose to translate our findings by using DPFs to specifically and efficiently reverse epigenetic silencing of genes, in particular tumor suppressors in cancer. Specifically, Our aims are:

- 1) Comprehensive investigation of TF sensitivity to and effect on DNA methylation.
- 2) Investigating the mechanisms of DNA demethylation upon the binding of DFs.
- 3) Epigenetic reactivation of Tumor Suppressor Genes in cancer cells.

Interested students should contact:

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