

Màj 03/07/2020

UE 2.2. Current concepts in Diabetes and cardiovascular diseases

12 ECTS

Parcours « *Diabetes and Cardiovascular Diseases* »

ST1 : From (epi)genetics and functional genomics to precision medicine of cardiometabolic diseases

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The goal of this seminar is to give an overview of the recent studies on the impact of both genetics and environment on the metabolic diseases. It will be constituted of analyses of articles by the students and lectures (including TED conferences). A renowned speaker will be invited to the closing of the session. A large part of this seminar will be dedicated to technologies used for the study of these multifactorial pathologies (i.e. experimental models, genome-wide association studies, next-generation sequencing, -omics integrated analyses). The influence of the environment on the development of the metabolic diseases will be also tackled both at the fundamental and clinical levels.

Duration : 2.5 days

Program :

Knowledge :

- to master the main methods in the field of human/rodent (epi)genetics and (epi)genomics
- to master the cutting-edge technologies in the field of (epi)genetics and (epi)genomics
- to master the state of the art of the genetics of type 2 diabetes (and related cardiometabolic disorders, including monogenic forms of these diseases)

Day 1 - Morning

- 1/ Basics of human (epi)genetics and genetic diseases (e.g. gene, mutation, monogenic disorder, polygenic disorder, heritability, epigenetic/regulatory factors)
- 2/ Monogenic disorders (e.g. monogenic diabetes): methods to identify and demonstrate a genetic aetiology, insights into pathophysiology
- 3/ Monogenic disorders (e.g. monogenic diabetes): methods to perform genetic diagnosis, insights into precision medicine

Day 1 - Afternoon

- 4/ Master class on next-generation sequencing (DNA-seq, RNA-seq, methyl-seq, ChIP-seq, ATAC-seq, HiC, single-cell NGS) and associated computer analyses
- 5/ Discussion on various articles on monogenic forms of cardiometabolic disorders, driven by the students

Day 2 - Morning

- 6/ Polygenic disorders (e.g. type 2 diabetes): methods to identify and demonstrate (epi)genetic aetiologies, insights into pathophysiology
- 7/ Polygenic disorders (e.g. type 2 diabetes): methods to integrate genetics and epigenomics data, insights into pathophysiology and population stratification

Day 2 - Afternoon

- 8/ Master class on applied biostatistics (association analyses based on rare and/or frequent variants, differential analyses, integrative analyses)
- 9/ Discussion on various articles on polygenic forms of cardiometabolic disorders, driven by the students
- 10/ TED talk

Day 3 - Morning

- 11/ Impact of the environment on the aetiologies of cardiometabolic disorders
- 12/ Master class on functional analyses (iPSC, CRISPR/cas9)
- 13/ How to obey the lab/ethical rules and to communicate scientific results, in the field of STC1?
- 14/ How to ensure a technology/scientific watch in the field of STC1?

Educational team : Amélie Bonnefond, Martine Vaxillaire, Didier Vieau