Lab methods : bioactive compounds screening

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<table>
<thead>
<tr>
<th>Cursus</th>
<th>Sem.</th>
<th>Type</th>
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<tbody>
<tr>
<td>Bioingénierie</td>
<td>MA1, MA3</td>
<td>Opt.</td>
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<td>Sciences du vivant</td>
<td>MA1, MA3</td>
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Language: English
Credits: 2
Withdrawal: Unauthorized
Session: Winter
Semester: Fall
Exam: During the semester
Workload: 60h
Weeks: 14
Hours: 2 weekly
Project: 2 weekly

Remarque
Schedule: November 13 to 17, 2017 (from 9AM to 5PM) - présence aux cours obligatoire

Summary
Introduction to the key principles and concepts underlying the screening activity to identify and to characterize bioactive compounds (chemicals, compounds, siRNAs and natural products) acting on a given biological target or a signalling pathway.

Content

• Presentation of the drug discovery principles and processes
• Description of the variety of molecular screening assays, from in vitro target-based to cellular phenotypic assays
• Detailed description of the screening activity, high throughput and high content, with special emphasis on the assay development and validation steps
• Generation of experimental results linked to selected assays: in vitro enzymatic, cytotoxicity and siRNA cell-transfection assay
• Evaluation and discussion of the generated data in the frame of the screening activity

Keywords
Screening / Drug discovery / Assay development / Assay validation / z' factor / siRNA / Transfection / Cell viability / Enzymatic activity / Inhibitor / Dose response

Learning Prerequisites
Required courses
Chemical Biology, Biochemistry, Cell Biology

Recommended courses
Bio-494 scientific project design in drug discovery

Important concepts to start the course
Basis of cell biology (cell viability, cytotoxicity, RNA interference, transfection)
Learning Outcomes

By the end of the course, the student must be able to:
• Assess / Evaluate the process of a screening campaign
• Choose a screening strategy for a given biological question
• Develop a screening assay
• Design a screening assay
• Propose an assay improvement
• Analyze results of a screening assay
• Carry out different kind of experiments to develop an assay
• Characterize effect of bioactive compounds
• Detect interferences
• Examine different mode of action
• Manipulate cells, compounds, reagents and fluids in microplate format
• Quantify the effect of compound through pharmacological curves fitting
• Perform cell-based experiments in sterile environment
• Present generated results to others
• Discuss results of experiments, in particular screening assays

Transversal skills

• Set objectives and design an action plan to reach those objectives.
• Evaluate one's own performance in the team, receive and respond appropriately to feedback.
• Take feedback (critique) and respond in an appropriate manner.
• Respect the rules of the institution in which you are working.
• Continue to work through difficulties or initial failure to find optimal solutions.
• Demonstrate the capacity for critical thinking
• Write a scientific or technical report.
• Take responsibility for health and safety of self and others in a working context.

Teaching methods

Ex-cathedra courses: Theoretical introduction and case studies presentations
Practical work: Performing experiments including results analyses
Interactive discussion of generated data and biochemical/biological relevance
Training and utilization of instrumental devices under expert supervision (readers, liquid handlers, automated microscope)
Attend robotic workstations demos during the visit of the screening platform labs.

Expected student activities

Attendance to the whole course
Read and understand experimental protocols
Carry out experiments in the lab (by group of 2)
Analyze daily results (basic statistic with computer), including critical evaluation
Share data and involvement in general discussion
Read some general papers of interest selected and related to the course
Assessment methods
Written examination at the end of the course