2. Genome Editing Workshop

Course details

Lecture 1: Introduction to Genome editing
- Genome editing-concept and history
- Types of genome editing- Insertion, deletion, inversion
- Cellular DNA repair mechanisms
  - Non-Homologues End Joining (NHEJ)
  - Homologues End Joining (HEJ)

Lecture 2: Genome editing tools
- Chemical or radiation mediated genome editing
- Engineered Nucleases
  - ZFNs
  - TALENs
- CRISPR/Cas9

Lecture 3: CRISPR/Cas9 based genome editing
- CRISPR- origin of concept
- History
- Mechanism
- Gene editing innovation

Lecture 4: Guide RNA designing
- Guide RNA- Concept, function, & importance
- Guide RNA designing tools
- Guide RNA designing guidelines

Lecture 5: CRISPR-based genome editing-experimental set up
- Vectors for CRISPR components
- Transfection into mammalian cells
- Reaction setup and workflow
- Confirmation of gene knockout
- Controls and troubleshooting

Lecture 6: Introduction to RNA Interference
- RNAi- history, concept and applications
- Knockout verses knockdown
- RNAi types
  - siRNA- concept and mechanism
  - miRNA- concept and mechanism

Lecture 7: siRNA mediated gene silencing
- siRNA designing rules
- siRNA designing and prediction tools
- siRNA reaction setup and experimental workflow
- Confirmation of gene silencing /knockdown
  - RTPCR
  - Western blotting
- Controls and troubleshooting

Lecture 8: miRNA mediated gene regulation
- Designing of miRNA
- miRNA repository (miRBase)
- miRNA target site prediction methods and tools
- miRNA reaction setup and experimental workflow
- Confirmation of gene knockdown
    - RTPCR
    - Western blotting
    - Northern blotting
- Controls and troubleshooting