

# Genomic Applications 2024

## De novo sequencing

- Assembly
  - WGS MGI
  - WGS stLFR MGI
  - WGS PacBio Hifi
  - WGS ONT
- Scaffolding
  - Intra chromosomal interactions
    - HiC Illumina
    - OmniC Illumina
    - Pore C Nanopore
  - Optical mapping
    - Bionano Saphyr
- Whole genome screening
  - WGS Illumina
  - WGS MGI
  - WGS PacBio CLR
  - WGS PacBio Hifi
  - WGS ONT

## SNP

- Gene targeting
  - Exome sequencing
    - WES Illumina
    - WES Illumina on FFPE samples
  - RNAseq
    - RNAseq Illumina
    - RNA Seq PacBio
- Targeted on selected fragments
  - Capture Seq
    - Capture Agilent Mybaits Illumina
  - Amplicon Seq
    - AmpliSeq
      - Thermo AmpliSeq (Ion Torrent)
      - Thermo AgriSeq (Ion Torrent)
      - AmpliSeq Illumina
    - Other GBS kit
      - TrueSeqNE Illumina
      - Allegro SPET TECAN Illumina
      - NEBNext direct Illumina
    - Amplicon Seq Custom
      - Fluidigm Access Array 48.48 Illumina
      - PCR custom pool Illumina
      - PCR custom pool PacBio
    - Allelic disequilibrium RNA Seq
      - RNAseq Illumina
- Reduced genome screening
  - Real time analysis sequencing
    - Adaptive sampling ONT
  - RE (restriction) - GBS
    - ddRADSeq
    - RADSeq
  - Low Pass Sequencing
    - WGS Illumina
    - WGS Twist Illumina

## Polymorphism study

- Known SNPs genotyping
  - Chip
    - Affymetrix Axiom
    - Illumina Infinium
  - Mass spectro
    - iPLEX Agena Bioscience
  - HD (Microfluidic)
    - Biomark 96 x 96
  - qPCR
    - Standard
      - Roche LC480
      - QuantStudio ThermoFisher (KASP ...)
    - Digital PCR
      - ddPCR
- Size analysis (SSR)
  - Particular samples
    - Liquid biopsy
      - WGS Illumina
    - Forensics
      - WGS Illumina
  - Sequence analysis
    - SSR on Illumina
    - SSR on Nanopore
    - SSR on PacBio Hifi

## Structural variants

- Whole genome screening
  - WGS
    - WGS Illumina
    - WGS PacBio CLR
    - WGS PacBio Hifi
    - WGS ONT
  - Optical mapping
    - Bionano Saphyr
- Targeted screening on enriched region
  - WGS PacBio Hifi after Cas9/12
  - WGS ONT after Cas9/12
  - WGS PacBio Hifi after Samplix
  - WGS ONT after Samplix
  - CODE-Seq
  - DRAK-seq
- Low Pass Sequencing
  - WGS Illumina
- CNV genotyping (Copy number screening)
  - PacBio CNV
  - ddPCR
- Insertion / Transposon study
  - TnSeq / INSseq

## Metagenomics

- Whole Metagenome
  - Illumina
  - Shallow Sequencing Illumina
  - SC CellenOne WGS Illumina
  - MGI
  - PacBio Hifi
  - ONT
- Barcoding
  - 16S Illumina
  - ITS & co Illumina
  - ITS & co MGI
  - 16S PacBio Hifi
  - PacBio Kinnex RNA 16S
  - 16S-23 S PacBio Hifi
  - 16S ONT
  - 18S ONT
- Metatranscriptomics
  - Illumina
  - SC CellenOne RNA Illumina
  - MGI
  - Nanopore
- Bacteria or viruses detection
  - Illumina
  - Nanopore
- Fungi detection
  - Illumina

## Transcripts study

- Tissue Expression
  - On array
    - Agilent arrays
  - By sequencing
    - Transcript study
      - RNAseq Illumina
      - RNAseq Illumina low input
      - BRB-seq Illumina
      - RNAseq Illumina on FFPE samples
      - RNAseq after Illumina Ribodepletion
      - RNA Seq Dualseq Illumina
      - 3'seq RNA profiling
      - RNA Seq Ion Torrent
      - RNA Seq ONT (cDNA)
      - RNA Seq ONT (cDNA) low input
      - RNA Seq ONT (oriented cDNA)
      - RNA Seq ONT (direct RNA)
      - RNA Seq MGI
    - Isoform study
      - Iso-Seq PacBio
      - Iso Seq PacBio after capture mRNA
      - PacBio Kinnex RNA
      - Isoform Study ONT
    - Long Non coding
      - Inc RNAseq after Illumina Ribodepletion
      - Inc RNAseq low input after Illumina Ribodepletion
      - Inc RNAseq after ONT Ribodepletion
    - Short Non Coding
      - miRNA Illumina
    - mRNA + miRNA
      - Comboseq (mRNA+miRNA)
      - Duoseq Illumina
    - Ribosome Profiling
      - Ribosome Profiling Illumina
    - Nascent RNA
      - SLAM-Seq Illumina
  - By HD qPCR
    - qPCR HD Takara Smartchip

## Single Cell Expression

- Short Reads
  - Transcripts
    - Abundants
      - With SC machine
        - 10x SC 3'mRNA Illumina
        - 10x SC 5'mRNA Illumina
        - 10x SC 3'mRNA Cellplex Illumina
        - 10x SC NucSeq Illumina
        - 10 x Illumina on FFPE sample
        - 10X SC ACME
        - 10X SC FLEX
        - Takara SC RNA-seq Full length
        - BacDrop
      - Without SC machine
        - SC RNAseq : SplitSeq + Illumina
        - scRNA-seq PARSE
        - SciPio
    - Low Input full length
      - 10x SC SMARTSeq3 Illumina
  - Transcripts & Proteins
    - 10x SC 3' RNA & Protein detection (Cite Seq / Cell Hashing)
    - 10x SC 5' RNA VDJ/Cite Seq Illumina
- Long Reads
  - SC Isoform Study
    - ScNaUmi-seq PARSE ONT
    - ScNaUmi-seq 10x ONT
    - 10X SC RNaseq + ONT
    - MAS-ISO-seq 10x PacBio
- Expression on microdissected area
  - DEP Array Excilone
  - Microdissection on FFPE sample

## Geolocated Single Cell Expression on Tissue Sections

- By sequencing
  - Spatial Transcriptomics
    - Visium + Illumina
    - Visium Illumina on FFPE samples
    - GeoMx + Illumina on FFPE samples
    - Slide-seq Curio Seeker + Illumina on Fresh Frozen samples
  - Spatial Isoform Transcriptomics
    - Visium + ONT
- By hybridization
  - Vizgen Merscope
  - Xenium 10X (Human/mouse)

## Regulation of expression

- DNA-Proteins interactions
  - ChIP Seq Illumina
  - CLIP-Seq
- 3D Conformation
  - Spatially close regions in the nucleus
    - HiC Illumina
    - OmniC Illumina
    - Pore C ONT
- Chromatin accessibility
  - Tissue
    - ATAC Seq Illumina
    - Cut & Run Illumina
  - Single Cell
    - MNase
    - 10x SC ATAC Seq Illumina
    - 10x SC MultiSeq (NucSeq & ATACSeq) Illumina
    - 10x Cut & Tag Illumina
- Methylation
  - DNA
    - Whole genome
      - Methylation dependant modification
        - Bisulfite Seq Illumina (C->T)
        - EMSeq Illumina (C->T)
        - TAPS Illumina (5mC & 5hmC -> T)
        - TAPS beta Illumina (5mC -> T)
      - Native DNA sequencing
        - ONT
        - PacBio Hifi
    - Reduced genome
      - RRBS Illumina
      - ONT sequencing after Cas9 enrichment
    - Methylated regions study
      - MeDIP Seq
    - Methylation study on targeted region
      - Capture Agilent Illumina sequencing
      - Bisulfite + Hybridation array
        - EPIC Chip Illumina
    - Echantillons particuliers
      - Liquid Biopsy
      - EM Seq
  - RNA
    - ONT

Caption In progress Under development