

## Methods in Translational Research

Jan 31, 11AM -5PM

Title	Content	Student
Cohort and clinical studies	Prospective and retrospective cohort studies - examples from the literature; KORA cohorts; odds-ratio, risk ratio; Clinical trial phases, Biobanking, ethical considerations	Gabi
Animal models for CLD	Bleomycin-induced LF, radiation-induced LF, silica-induced LF, MHV-68-induced lung fibrosis (Adler lab!), Ela, CS, Lung tumor models, OVA, HDM	Gabriel
Transgenic mice	Genotyping, global KO, Cre/Lox system, RTTA system, cell-specific drivers (lung!), lineage tracing, experimental set-up (controls)	Vijay
Cell and tissue culture	Cell counting, suspension culture, adherent culture (examples of primary cells & cell lines run @ CPC), contaminations, 3D culture (ALI, organoids, tissue slices), decel/recel	Ali
Functional analysis in vitro	Viability, proliferation, apoptosis, migration, invasion, adhesion, TEER, AFM, cell traction	Jie
Flow Cytometry & Cell sorting	Cell sorting (FACS & magnetic), quantification, phenotyping, analysis and interpretation	David

Feb 1, 1PM-4PM

Nucleic acid analysis	DNA and RNA isolation (including DNA iso from tailcut/earclip), measure quantity and quality (A260/A280 etc), Northern Blot, Southern Blot, general PCR principles	Pushkar
qRT-PCR	TaqMan, Sybr, Primer Design, Primer test, Melting curve analysis, SNP genotyping (TaqMan-based)	Lucas
Genetic manipulation in vitro	Types of plasmid systems (classical PCR-restriction cloning, In-Fusion, Gateway, TA, Piggy-Bac system...), (stable) overexpression, introduction of mutations, knockdown (sh/siRNA), lentiviral transduction, Crispr/Cas9, reporter plasmid (luciferase assays, e.g. CAGA, TOP/FOP)	Shruthi
Genomics/Transcriptomics	GWAS, RNA quality (Bioanalyzer), hybridization, RNA-Seq, single-cell analysis	Donovan

Feb 2, 9AM - 1PM

Protein-DNA interaction	EMSA, CHIP, DNA footprinting, in silico promoter analysis	Lianyong
Protein analysis	Protein extraction protocols, Protein concentration determination (BCA, Bradford, Lowry, A280), Subcellular fractionation, SDS-PAGE, native PAGE, WB, ELISA, Licor	Gizem
Proteomics	Sample preparation, Methods of digestion, mass spectrometers (MS/MS, MALDI-TOF), peptide identification and quantification software	Laura
Pathway enrichment analysis	Analysis of online available data (GEO); Software for data analysis (DAVID, Ingenuity)	Li
Protein-protein interaction	Pulldowns (IP, GST-tag...), crosslinking, FRET, Proximity ligation assay, STRING database	Ivette
Histology & electron microscopy	Paraffin embedding, fixation, and tissue processing, H&E, Masson Trichrome, Van Gieson's Stain, Hart's elastic stain, TEM, SEM, sample preparation, staining procedures	Qing
Immunohistochemistry	Antibody structure, IHC protocol, immunofluorescence (advantages/disadvantages vs. IHC), typical structural lung cell type markers (AT1, AT2, Clara, Goblet, basal, fibroblast, lipofibroblast, endothelial cells), typical markers for subcellular compartments (ER markers, mitochondrial markers, Golgi, phalloidin, DAPI, Hoechst, lysosomal dyes)	Wendy