NUCLEIC ACID BIOLOGY AND TECHNOLOGY

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Molekylærbiologi: Ja
Molekylær medicin: Ja
Bioteknologi: Ja

The group consist of: 6 postdocs, 2 lab. technicians, 8 PhD students, 2 Master thesis student, bachelor students and 1 Prof.

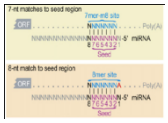
The focus of our lab has three pillars:

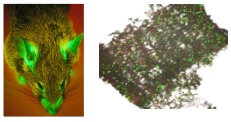
a) The understanding of how small non-coding RNA contribute to cell maintenance and disease development with a primary aim of defining new targets for disease intervention.

b) The creation of novel bioimaging and delivery systems for gene medicine including siRNA, miRNA mimics, antimiRs (antisense targeting microRNA) with a specific focus on inflammation, cancer, influenza and regeneration of damaged tissue (tissue engineering)

c) Design and construction of functionalized self assembled DNA and RNA nanostructures capable of complex biosensing, coupled with controlled action e.g. drug release, enzyme activation and receptor signaling.

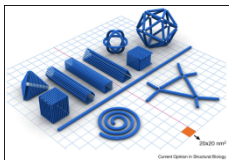
The understanding of how microRNA target mRNA – target prediction





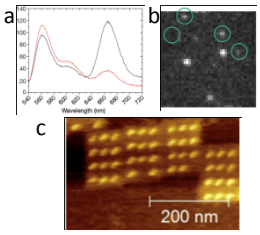
3D scaffold functionalized with EGFP expressing stem cells and siRNA nanoparticles

Examples of DNA nanostructures created by us and others

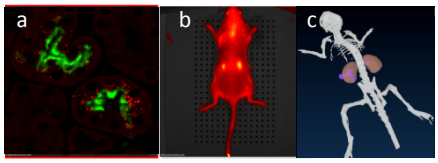


Examples of techniques used:

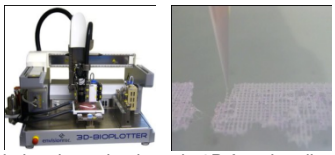
- Deep sequencing for RNA profiling
- Photoactivatable ribonucleoside-enhanced crosslinking and immunoprecipitation (PAR-CLIP)
- RNA bioinfomatics
- Aptamer selection
- Fluorescence microscopy
- Ensemble and single molecule FRET
- 3D in vivo imaging
- siRNA delivery techniques
- Conjugation chemistry (e.g. Click Chemistry)
- High Throughput Q-PCR
- Fluorescence-activated cell analysis
- RNA and DNA biochemistry



Analyzing self assembled DNA nanostructures by a) Fluorescence resonance energy transfer (FRET) b) Single molecule (smFRET) c) Atomic force microscopy (AFM)



Tracking siRNA *in vivo* by a) immunohistochemistry b) whole animal bioimaging c) 3D reconstruction



Printing tissue implants in 3D functionalized with stem cells and siRNA nanoparticles

Examples of projects:

- Biosynthesis and function of circular RNA in development of human disease
- Next generation sequencing for profiling RNA expression in differentiating stem cells
- Control of stem cell differentiation in 3D scaffold by siRNA, miRNA and antisense technology
- Therapeutic application of siRNA for treatment of inflammation
- Selection and characterization of aptamers penetrating blood-brain-barrier
- Conjugation of proteins, peptides and aptamers to nanoparticles for improved targeting of imaging contrast and/or siRNA/miRNA
- Nanopatterning of cell receptor ligands on self-assembled DNA nanostructures for increased cell signalling
- Controlled of drug release from self assembled DNA nanostructures inside cancer cells

More information at www.RNAi.dk and www.nanomedicine.dk (Lundbeck center LUNA)
Publications: http://pure.au.dk/portal/en/jk@mb.au.dk