

Department of Life Sciences

NANOTHERANOSTICS@CIGMH



Pedro Viana Baptista

(PI)

Pharmacy degree –
Universidade de Lisboa
PhD Human Molecular
Genetics – University of
London
Agregação Biotechnology,
Nanobiotechnology –
Universidade Nova de Lisboa

Research Unit: Polo1 - Centro de Investigação em
Genética Molecular Humana

Team: Post-docs: Margarida M. Santos, Letícia Giestas,
Rita Cabral; PhD students: João Rosa, João Conde,
Miguel Larginho, Bruno Veigas, Fábio Carlos, Milton
Cordeiro; BIs: Ana Cordeiro; MSc students: Pedro
Pedrosa, Pedro Penedo

Objectives

At the intersection of Molecular Genetics and Nanotechnology, we have focused our research on the use of noble metal nanoparticles (mainly gold and silver) for new diagnostics and therapeutics platforms. Focus has been on:

- 1- nanodiagnostics (cancer and TB)
- 2- nanotherapeutics – use of gold nanoparticles for vectorization of therapeutic agents against cancer
- 3- nanobiophotonics - manipulation of nucleic acid synthesis, recognition and characterization based on light manipulation; study of influence of nanoparticles and nanosurfaces on spectral behaviour mediated by DNA/RNA molecules and potential of application in diagnostics (in vitro and in vivo)
- 4- label free biosensors for DNA/RNA characterization

Methodology

- Gold, silver and gold:silver alloys nanoparticles to create sensitive molecular diagnostics based on recognition of specific target DNA/RNA sequences
- Nanofluidics
- Use of gold nanoparticles in multifunctional assemblies towards effective and flexible vectorization of therapeutic agents (e.g. gene silencing approaches) in cell culture and model animals
- Drug and gene targeting
- Spectral characterization of nanoconjugates
- Surface functionalization
- Standard molecular genetics approaches

Expected Results

>Gold nanoprobe for molecular diagnostics [point-of-need diagnostics tools]

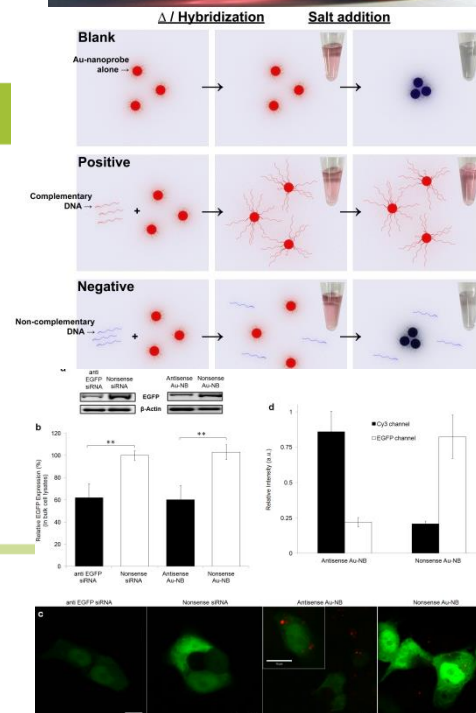
- Use of nanoprobe for the detection of specific DNA/RNA sequences
- Nanoprobes for SNP/mutation detection - obesity related genes
- Nanoprobes for pathogen identification - *Mycobacterium tuberculosis* and mutations associated with antibiotic resistance

>Nanotechnology for gene expression studies in cancer

>Gold nanobeacons - control of ex vivo gene expression and intracellular tracking

>Biosensors - use of thin film transistors technology for label free realtime measurement of DNA/RNA - application to diagnostics

>Gold nanoparticles as vectors for targeted gene therapy in cancer



Funding: FCT/MEC: PTDC/BBB-NAN/1812/2012;; PTDC/CVT/111634/2009;
PTDC/CTM-NAN/109877/2009; PTDC/QUI-QUI/112597/2009; EU FP7 - THEME [SME-
2012-1] [Research for SMEs] - LungCARD