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MagnetoTheranostics RTD 2013

FNSNF

From superparamagnetic nanoparticles to cancer detection and treatment

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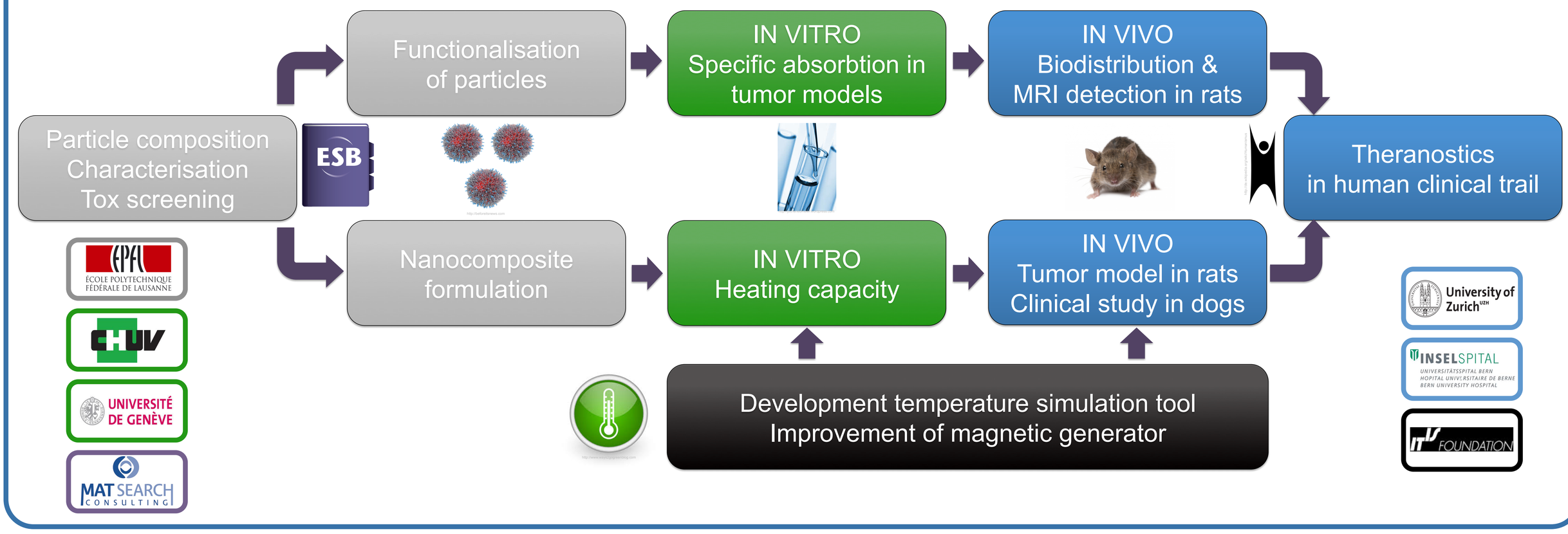
Project Layout



AIM: **diagnostic** (MRI) and **treatment** (hyperthermia) of **lymph node metastases** of prostate cancer = **Theranostics**

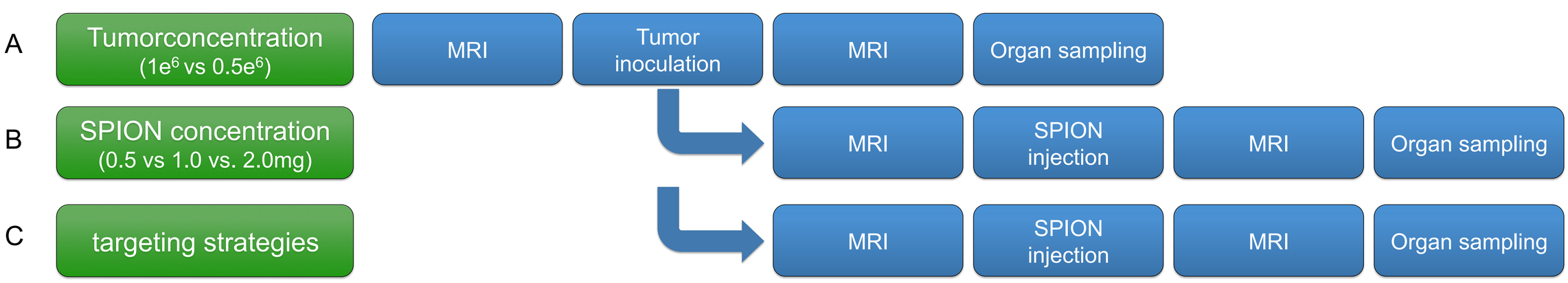
Experimental study plan

Tumor model & cell marker

- A prostate tumor model (MatLyLu cells) in Copenhagen rats will be used, with a high metastatic potential[1]
- PSMA will be used as cell marker, because its overexpressed in primary prostate adenocarcinoma and and lymph node metastasis[2]. Its expression could be verified *in vitro* on MatLyLu cells.
- The targeting strategy is based on 3 moieties, all targeting the extracellular domain of PSMA (antibody J591[3], urea-based small molecule[4], aptamer A10[5])

Study design

- **1st Preliminary study (A)**
  - 12 rats, 2 groups, tumor concentration $1e^6$ vs $0.5e^6$ cells, observation: 2, 4, 8, 10, 12, 14 days
- **2nd Preliminary study (B)**
  - 9 rats, 3 groups, SPION concentration 0.5 vs 1.0 vs 2.0 mg ironoxide/rat
- **Main study (C)**
  - 3 groups for targeting strategies (antibody J591 / aptamer A10 / urea-based small molecule)
  - Each targeting strategy: 24 rats, 4 groups (survival time 1, 2, 4, 6 days)
  - Negative controls: healthy rats with 3 targeted SPIONs (aptamer A10, urea-based small molecule, antibody J591)
  - Positive controls: “tumor” rats and SPIONS devoid of their targeting moieties



1) Isaacs, John T. et al. 1986, 2) Silver, Pellicer et al. 1997, 3) Tagawa, Milowsky et al. 2013, 4) Vallabhajosula, Nikolopoulou et al 2014, 5) Cheng, Teply et al. 2007