Towards a mechanistic understanding of nanoparticle behavior using zebrafish

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Proposition accompanying the thesis:

"Towards a Mechanistic Understanding of Nanoparticle Behavior *using* zebrafish"

1. Delivery of a therapeutic cargo to the desired place in a living system is not a simple task and requires a detailed understanding of the complete route and biological processes involved.

2. The lack of standardized and optimal parameters in nanoparticle design makes selective targeted nanoparticle delivery challenging.

3. Conventional 'trial and error' approach in nanomedicine should stop immediately. The understanding of fundamental behavior of nanoparticles and the identification of molecular interactions at the nanoscale level provide the possibility to rationally design simple and more efficient delivery nanosystems. **(This thesis)**

4. *In vivo* models that allow the dynamic assessment of nanosystems under research and the translation of nanomedicines are absolutely essential to pursue a successful progress into the clinic.

5. An *in vivo* study must be preceded by a complete and robust characterization of the physicochemical properties (*i.e.* size, shape, surface charge) and stability of nanoparticles. This contributes to the prediction and comprehension of nanoparticle behavior and interactions *in vivo*. **(This thesis)**

6. Zebrafish, with its benefits and drawbacks, has demonstrated to be a versatile, predictive and very valuable animal model in nanomedicine. **(This thesis)**

7. Stabilin-1 and Stabilin-2 are key scavenger receptors, expressed in liver sinusoidal endothelial cells, required in the sequestration of anionic nanoparticles from circulation. **(This thesis)**

8. Interdisciplinary collaboration (*i.e.* chemists, biologists, pharmacists, physicists, immunologists, computational scientists) during research, in general and even more so in the complex nanomedicine field, increases the possibility of clinical success.

9. Family is a strong driving force, its support is a boost of energy in the development and success of any project in life.

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