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## Phase separation in lipid-based nanoparticles: exploring the nano-bio interface

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## **Phase Separation in Lipid-based Nanoparticles: Exploring the nano-bio interface**

1. Lipid-based nanoparticles employing diacylglycerols (and molecular analogues) as lipid components, phase-separate and hijack an endogenous lipid transport pathway, leading to a selective behavior at the nano-bio interface. (Chapters 2-5)
2. Interpretation of the supramolecular organization of lipid-based nanoparticles, and observation of key nano-bio interactions are necessary to understand nanoparticle behavior *in vivo*. (this thesis)
3. In nanomedicine, magic bullets are desired but potent cannons are not ideal. To achieve cell-selective therapeutic delivery, less potent but more specific is better than more potent but less specific. (Chapter 5)
4. Soft materials must not be characterized by standard electron microscopy techniques. Cryogenic conditions are necessary to preserve the native state of nanoparticle morphology and aid for the better understanding of nanoparticle self-assembly. (Chapters 2-5)
5. Exploiting endogenous mechanisms to manipulate nanoparticle fate *in vivo* is a more effective strategy for targeted nanomedicine than empirical screenings.
6. Scientists working on the preclinical development of lipid nanoparticle-based drugs should not miss the bigger picture. Rather, they should educate themselves on how the development pipeline works from benchtop to clinic.
7. The clinical potential of a nanoparticle often lies in its simplicity.
8. Initiating a challenging project sometimes requires – similarly to a chemical reaction – overcoming the activation energy.
9. Publishing is an important driving force for science, but often is an unjust success metric that jeopardises creativity and curiosity.
10. A PhD requires you to personally grow, and develop resilience. You need go past mastering a field and push the boundaries of human knowledge to advance the field further. (thesis cover)
11. Self-confidence – the sense of believing you *are* – is often an overestimated, devolving personality trait. Rather, self-efficacy – the sense of believing you *can become* – is much more powerful and constructive for the personal development of a scientist.
12. Education and scientific knowledge should not be a privilege of the few, but accessible to everyone.