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Biomimetic nanostructured lipidic materials for encapsulation of therapeutic proteins

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Proteins and peptides represent the fastest growing class of pharmaceuticals with application as drugs, vaccines and diagnostics. However, they present significant challenges for drug delivery due to their complexity and fragile nature. Hybrid protein-lipid materials are highly prospective bionanomaterials for the long-term storage and controlled release of therapeutic proteins and peptides. The lipid nanostructure offers the potential for targeted and controlled release of the bioactive molecule, while retaining the protein in a functionally active form. In order to advance the use of such materials we must understand the relationship between the nanostructure of the lipidic material, the encapsulated protein and their end use in drug delivery.

The research presented aims to elucidate the fundamental physicochemical interactions between encapsulated proteins and peptides and lipidic materials suitable for drug delivery. In order to screen the large compositional space associated with the design of such materials, the project makes use of high-throughput methodologies, and employs large national and international facilities such as the Australian Synchrotron, the Bragg Institute and ASTRID 2 synchrotron, Denmark. The impact of encapsulated protein on the lipid nanostructure has been determined for a wide range of proteins and peptides. In addition the effect of the lipid nanostructure on the conformation and activity of the proteins has been determined directly within the lipidic material. Small-angle neutron scattering data on contrast matched lipidic materials has allowed the determination of protein location within the material for the first time. Results presented will guide the development of novel lipidic materials for the encapsulation and controlled release of protein and peptide based therapeutics.

Keywords or phrases (comma separated)

nanostructured lipidic materials; therapeutic proteins

Are you a student?

No

Do you wish to take part in the Student Poster Slam?

No

Are you an ECR? (<5 yrs since PhD/Masters)

No

What is your gender?

Female

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