Nanoparticles for Nanomedicine

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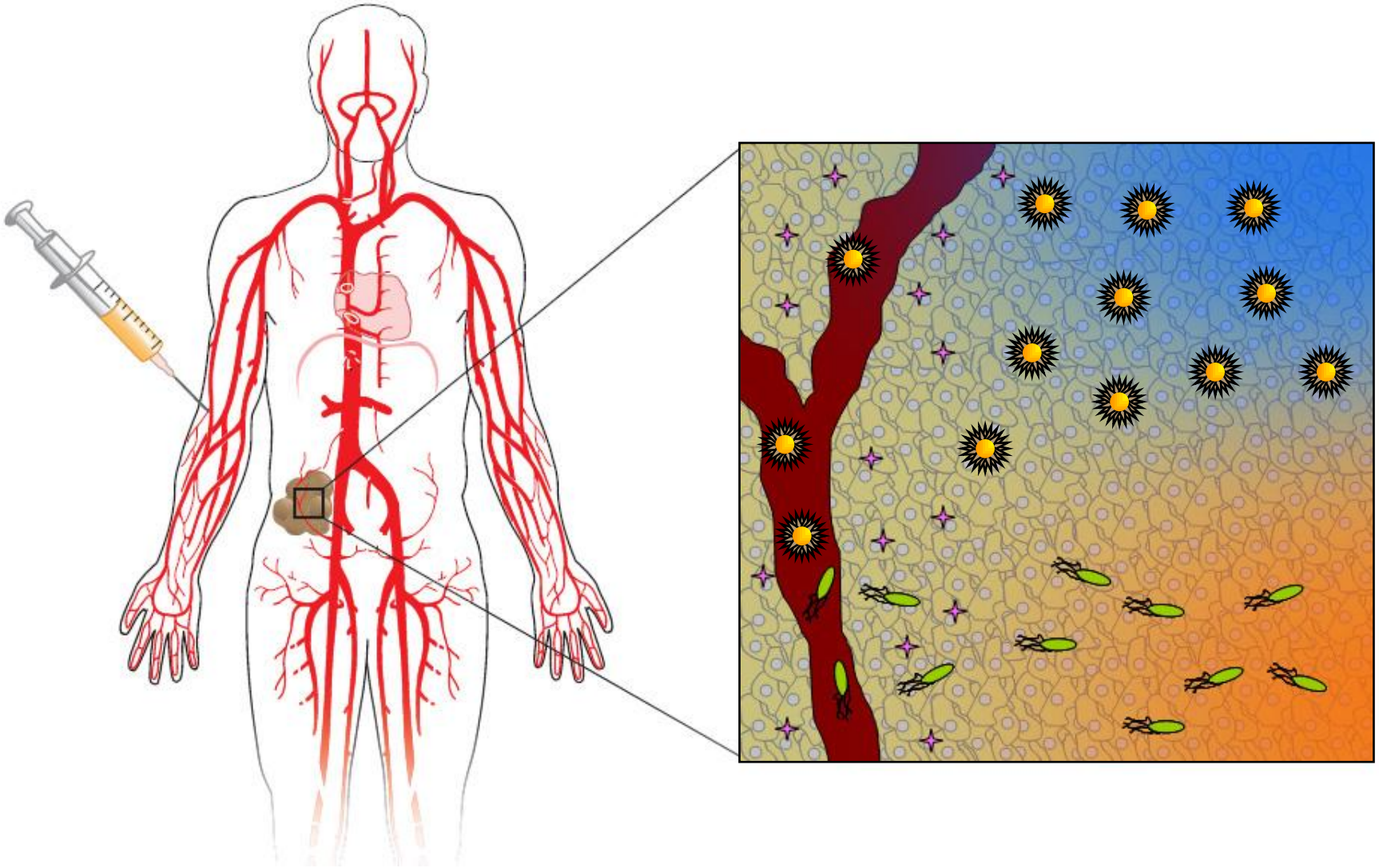
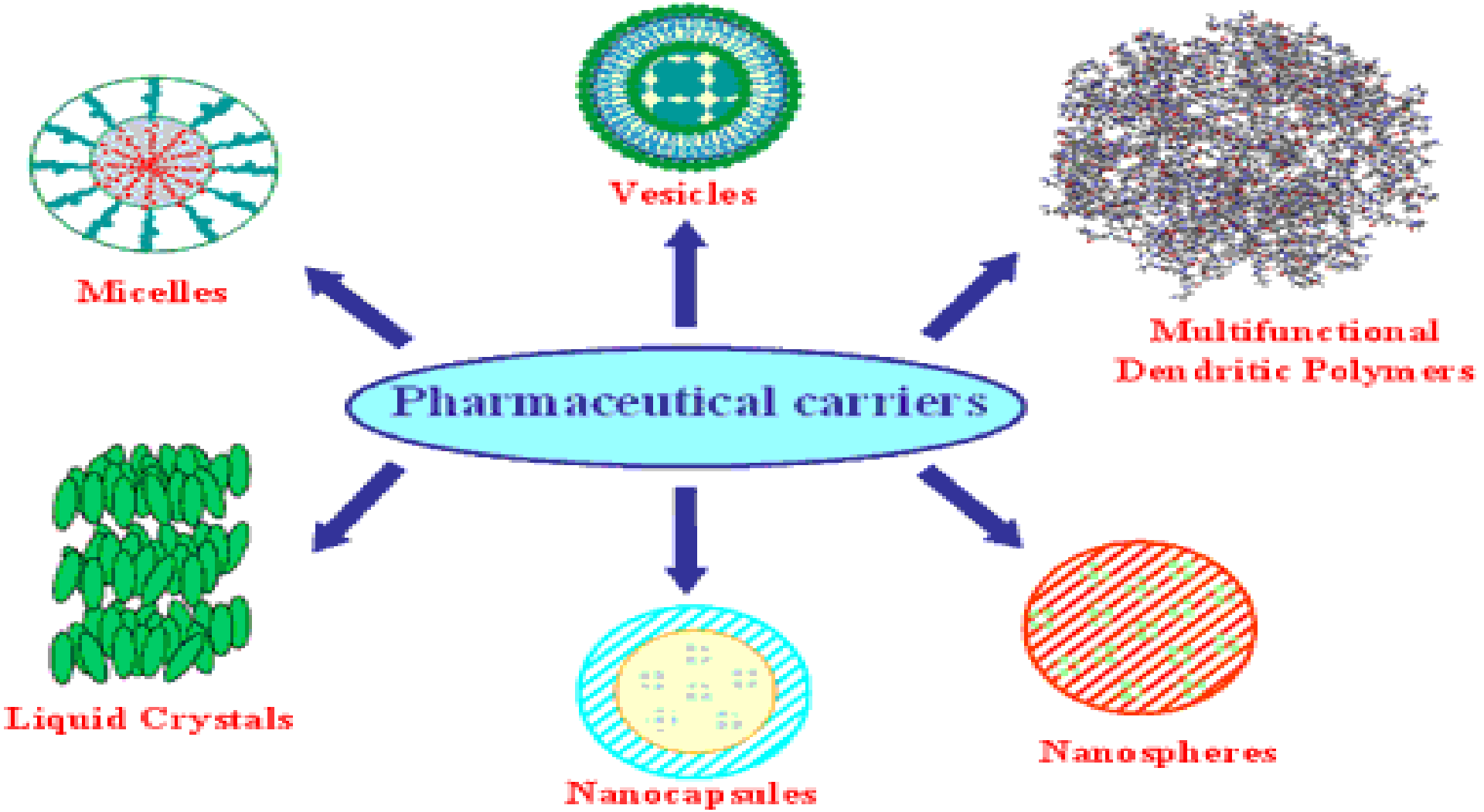
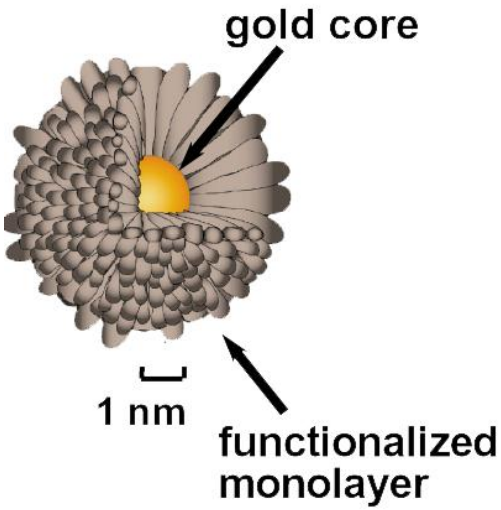
Targeted Delivery

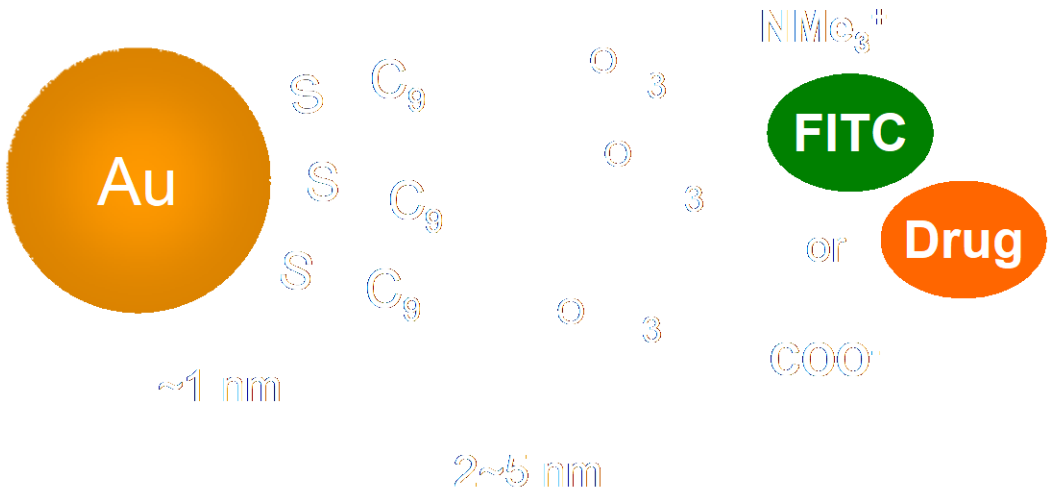


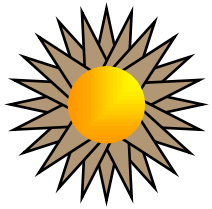
Drug Delivery Carriers



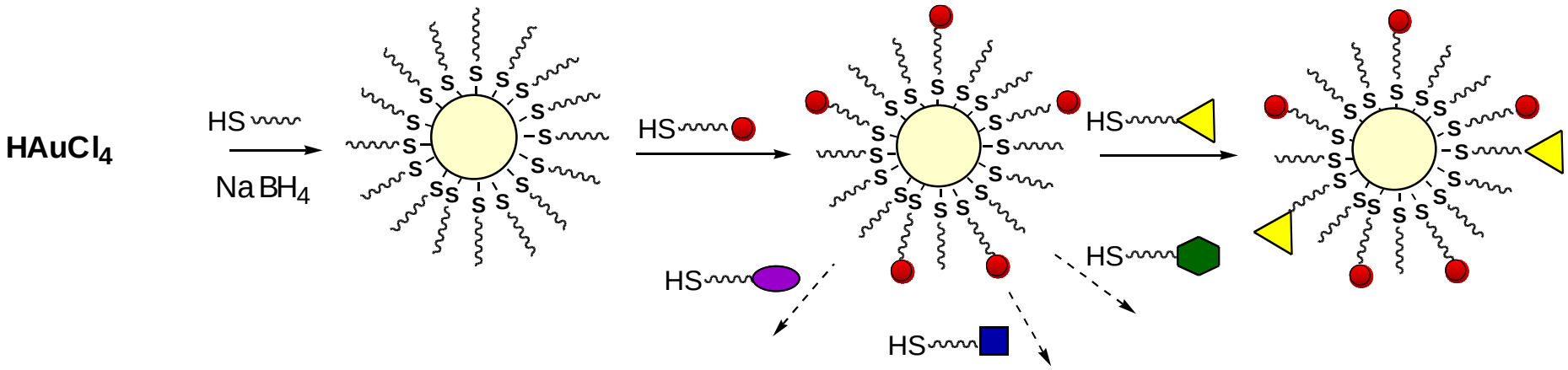
Design of Nanoparticles





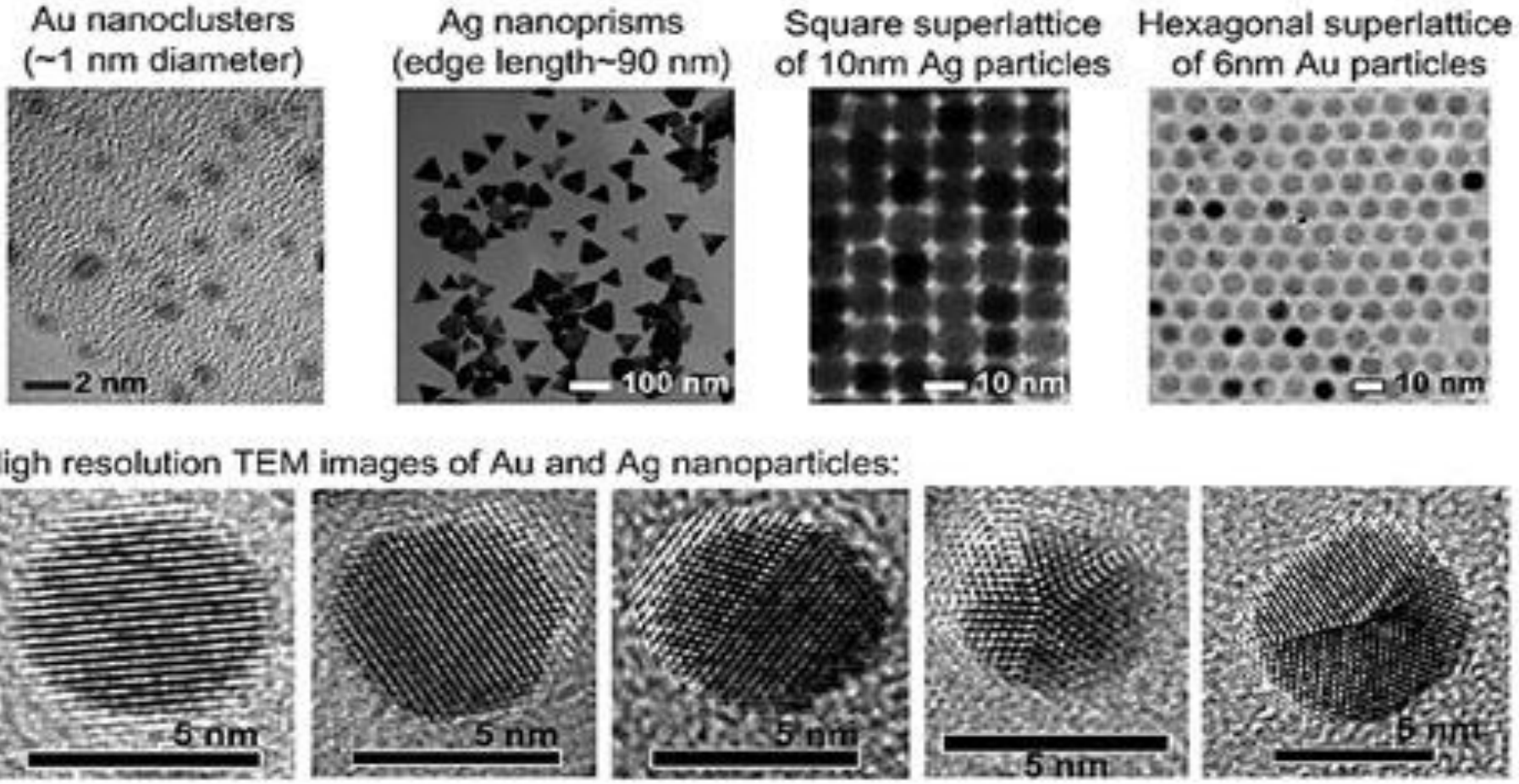


Synthesis of Gold Nanoparticles



- AuCl4- salts are reduced using NaBH4 in the presence of thiol capping ligands
- The core size of the particles formed can be varied from <1 nm to ~ 8 nm
- The surface functionality can be controlled through the choice of thiols

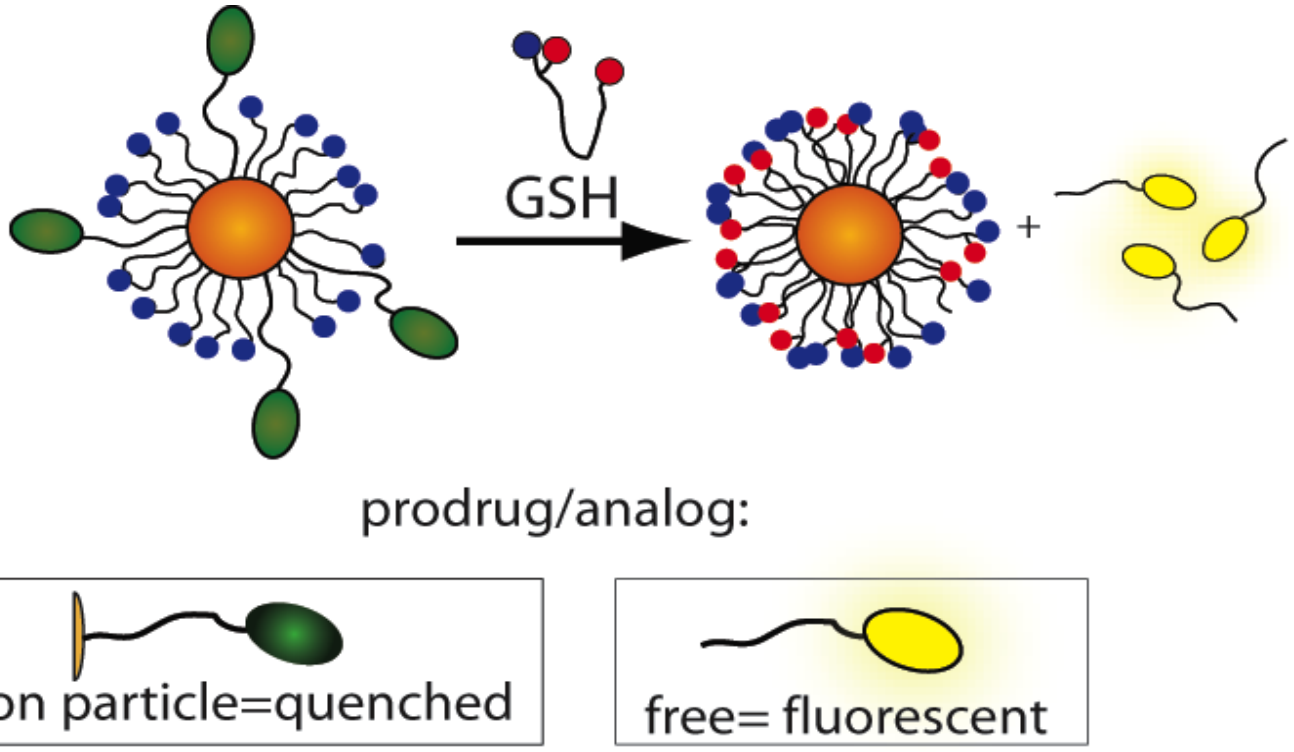
Nanocluster



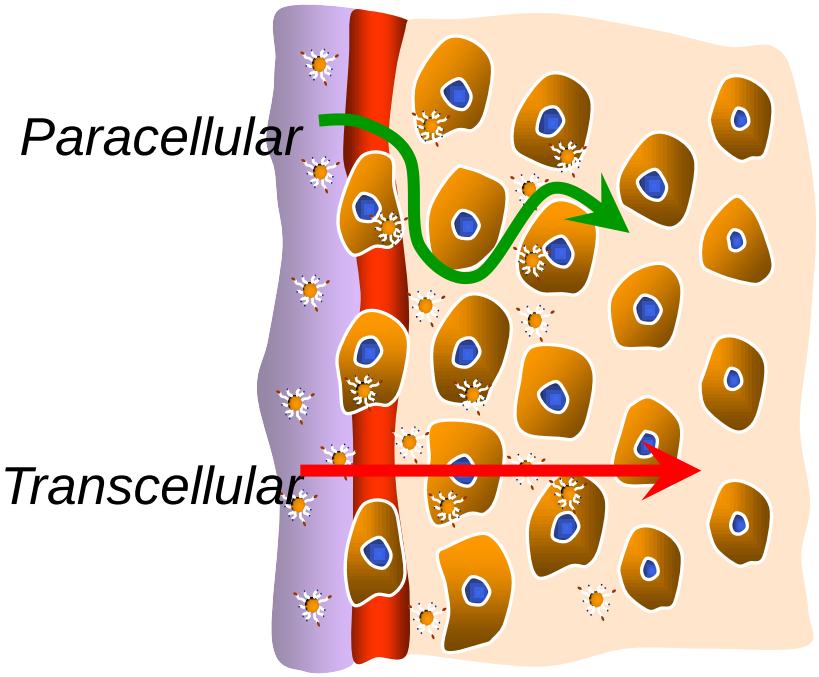
Nanoparticles for Drug Delivery

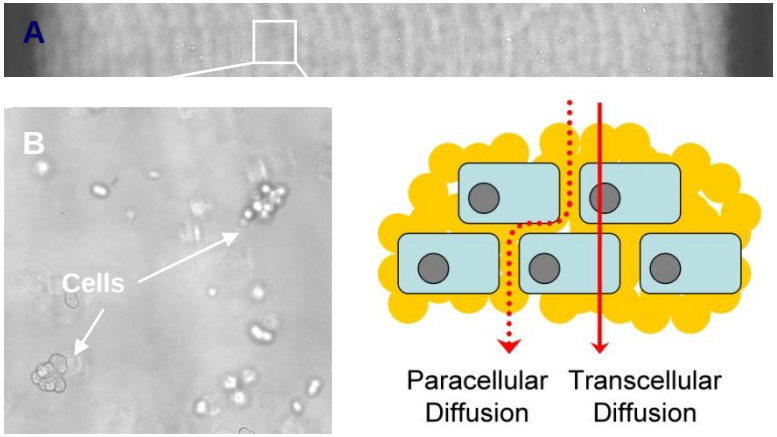
- Metal-based nanoparticles
- Lipid-based nanoparticles
- Polymer-based nanoparticles
- Biological nanoparticles

Fluorophores and Drugs Selectively Dissociate Inside Cells

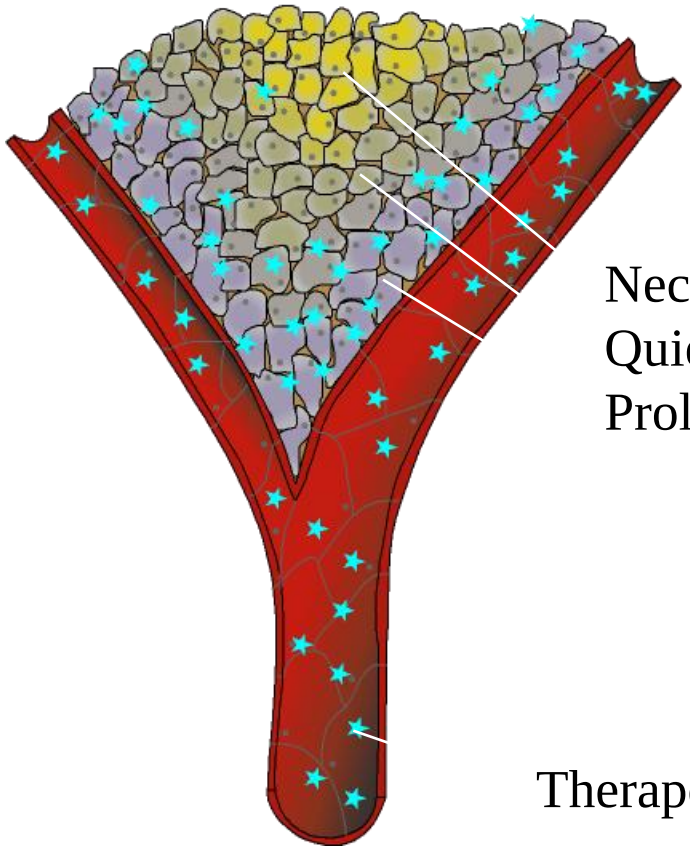


Particle Charge & Tissue Penetration





Targeted Intratumoral Therapy



- Quantify tumor microenvironments
- Develop vectors to target tumor quiescence

Immunoisolation for Cell-encapsulation therapy

- Liver Dysfunction: Encapsulation of Hepatic Cells
- Pancreas Dysfunction: Encapsulation of Islets of Langerham
- Disorders of the CNS: Parkinson's, Alzheimer's
- Pre-requisites for cell encapsulation
  - continued and optimal tissue/cell supply
  - maintenance of cell viability and function
  - successful prevention of immune rejection
- Nanoporous Silicone-based biocapsules serves as Artificial Pancreas(Desai et al. 2001)
- What are the drawbacks of such an artificial pancreas?

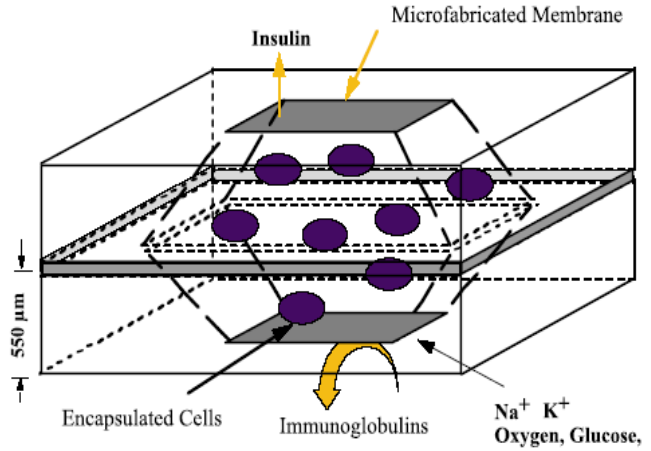


Fig. 1. Schematic of immunoisolation biocapsule which allows nutrient to diffuse freely but excludes immune components.

THANK YOU