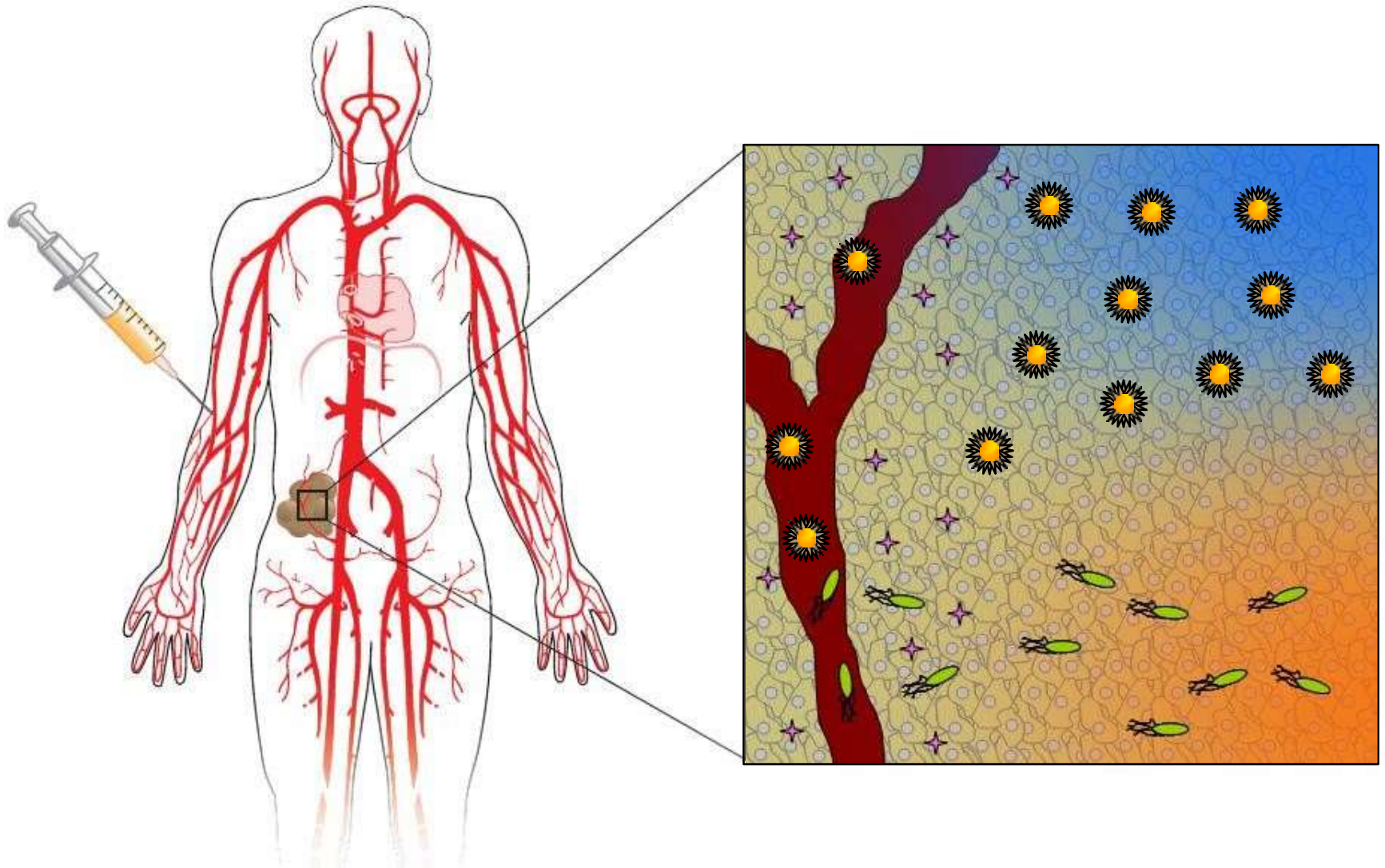


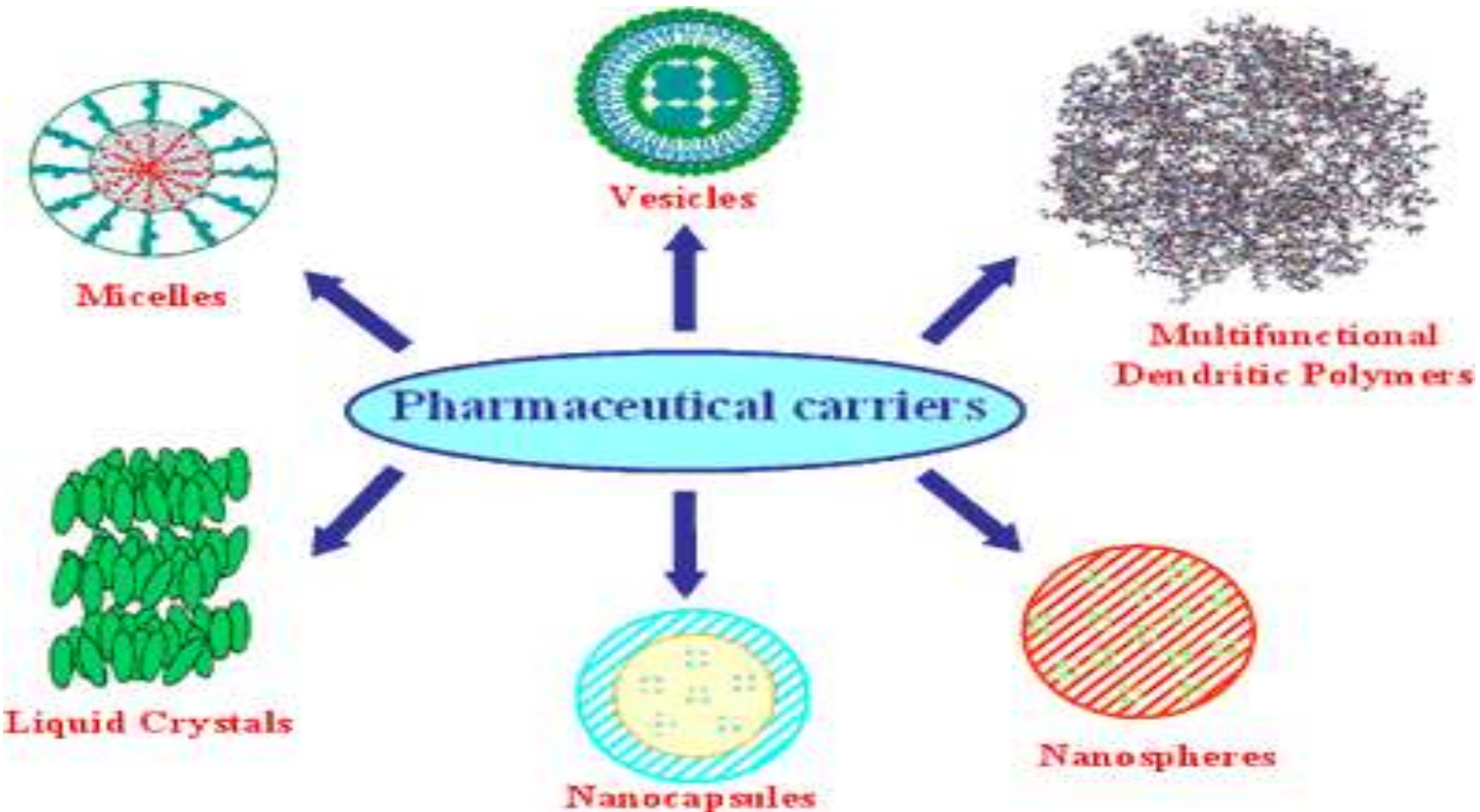
Nanoparticles for Nanomedicine

Dr. K. Premkumar
Associate Professor
Dept of Biomedical Science
Bharathidasan University

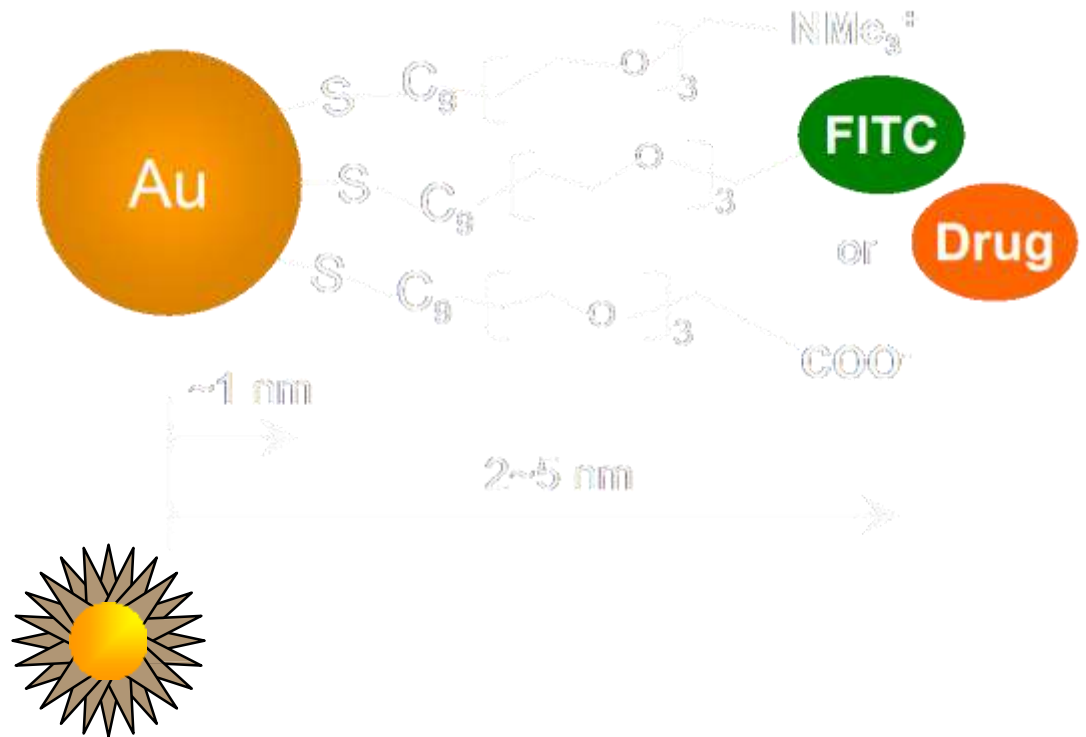
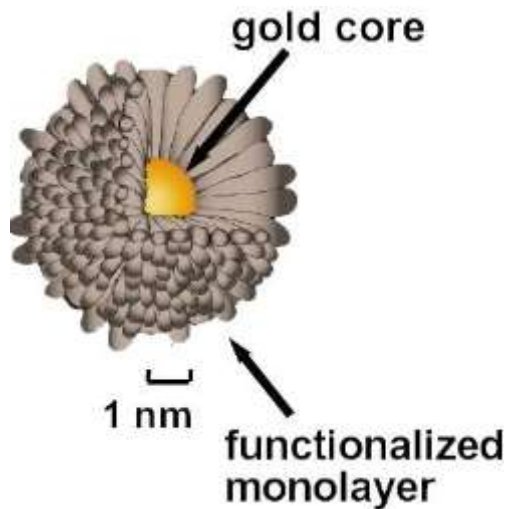
Targeted Delivery



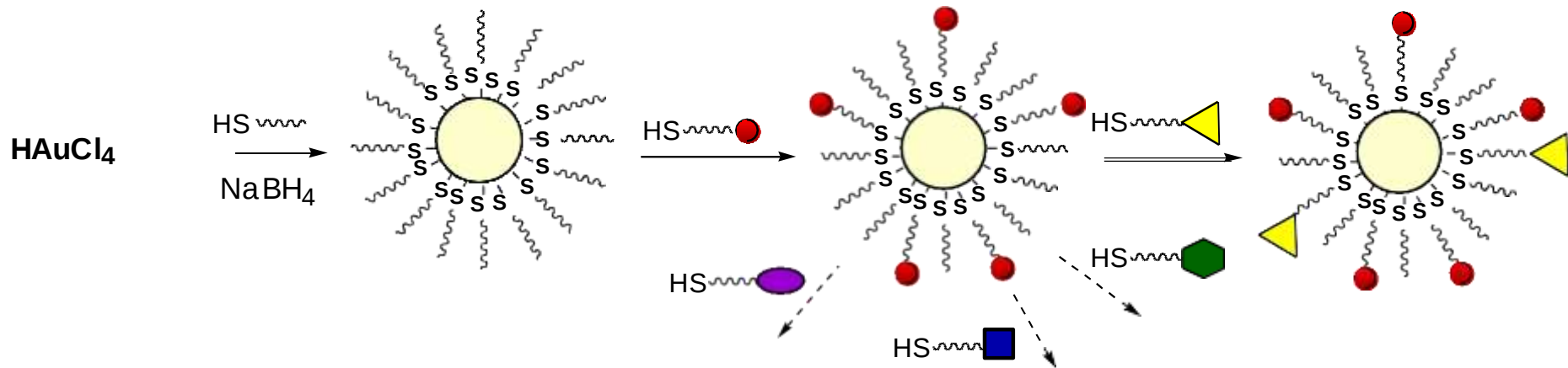
Drug Delivery Carriers



Design of Nanoparticles



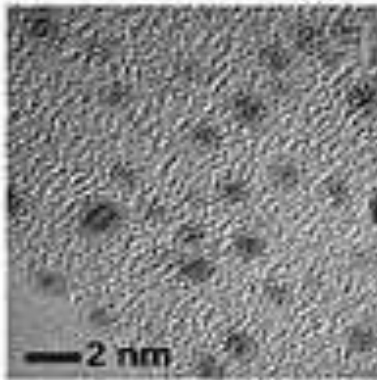
Synthesis of Gold Nanoparticles



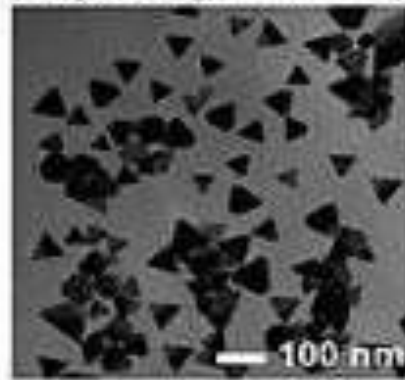
- AuCl_4^- salts are reduced using NaBH_4 in the presence of thiol capping ligands
- The core size of the particles formed can be varied from <1 nm to ~ 8 nm
- The surface functionality can be controlled through the choice of thiols

Nanocluster

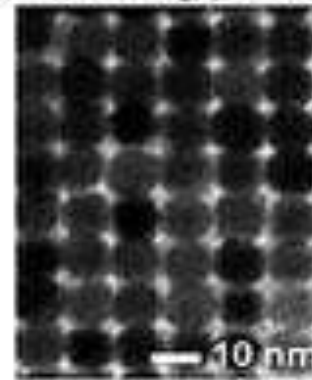
Au nanoclusters
(~1 nm diameter)



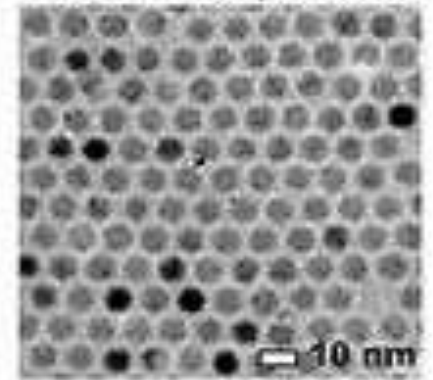
Ag nanoprisms
(edge length ~90 nm)



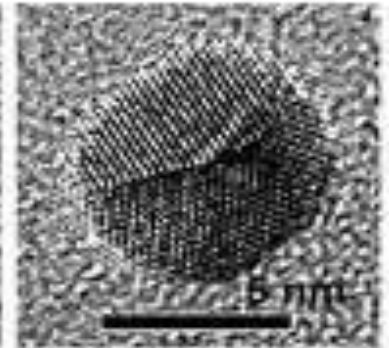
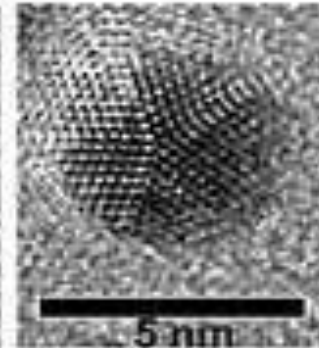
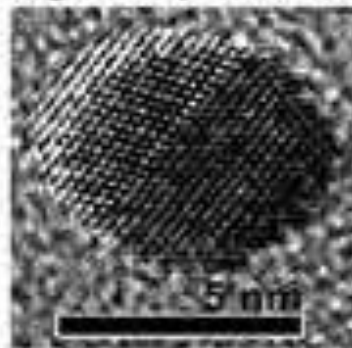
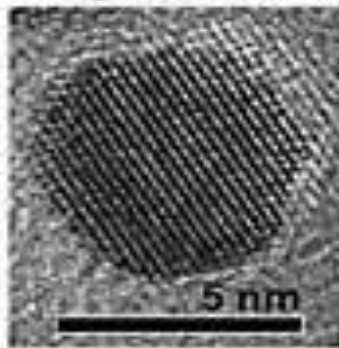
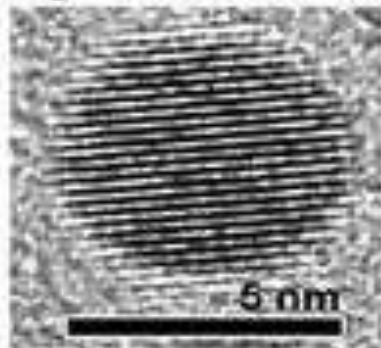
Square superlattice
of 10 nm Ag particles



Hexagonal superlattice
of 6 nm Au particles



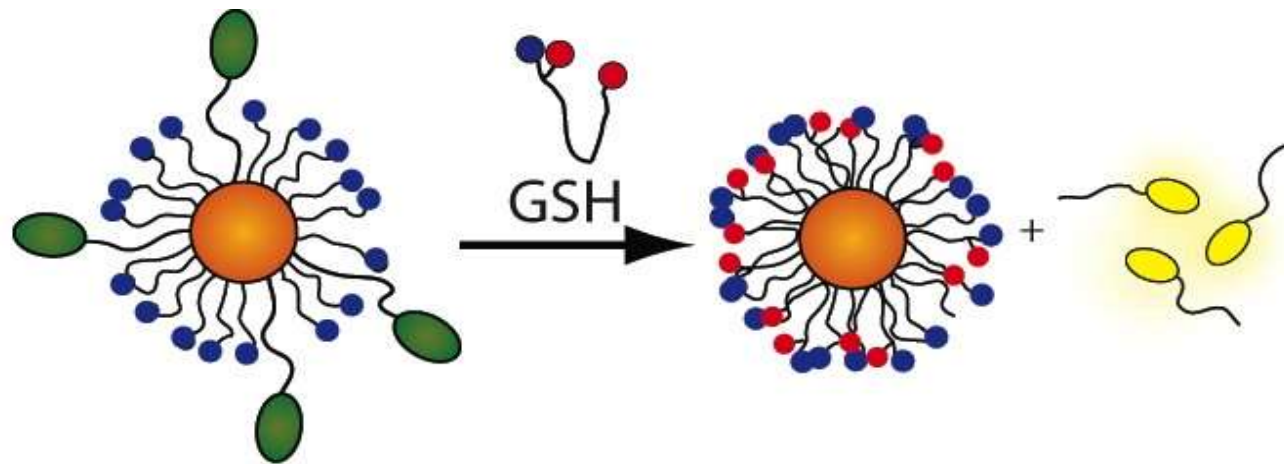
High resolution TEM images of Au and Ag nanoparticles:



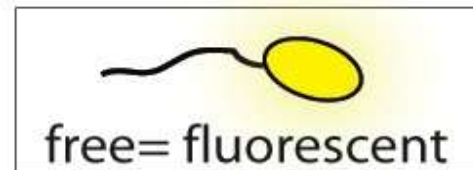
Nanoparticles for Drug Delivery

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

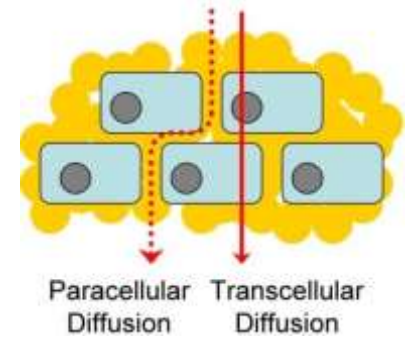
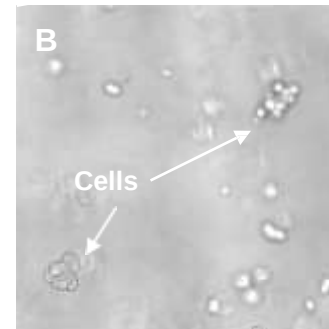
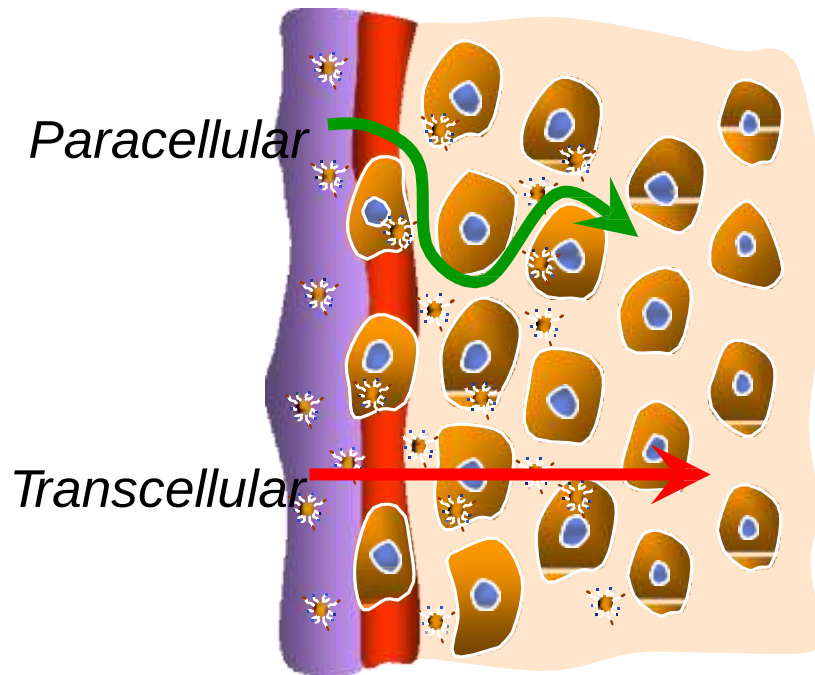
Fluorophores and Drugs Selectively Dissociate Inside Cells



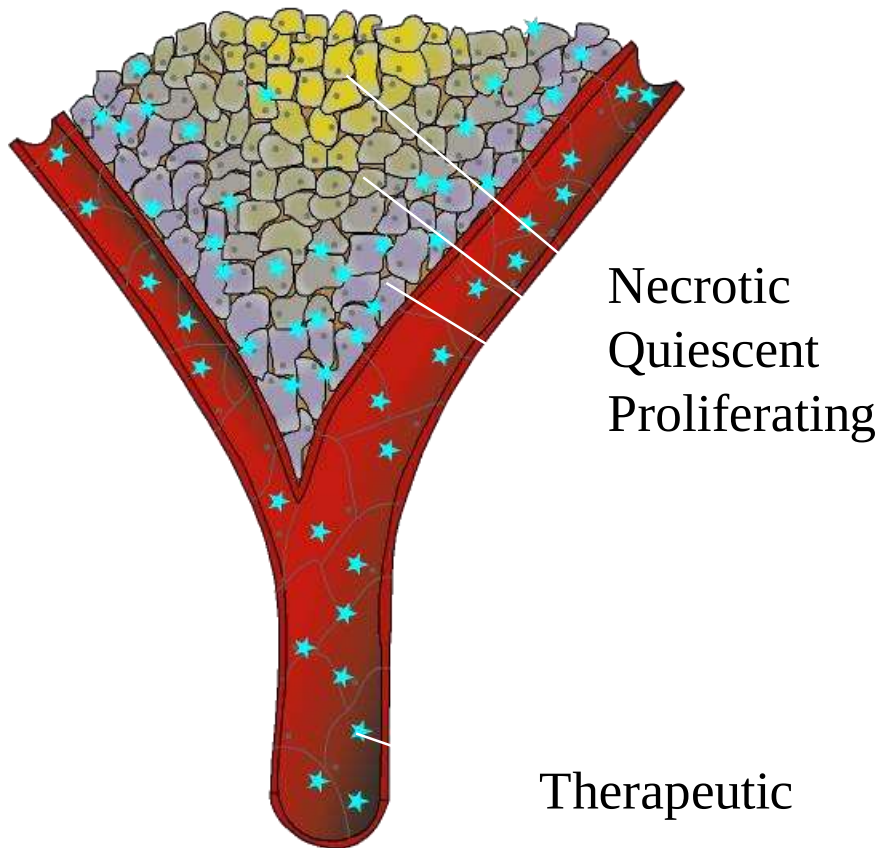
prodrug/analog:



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?

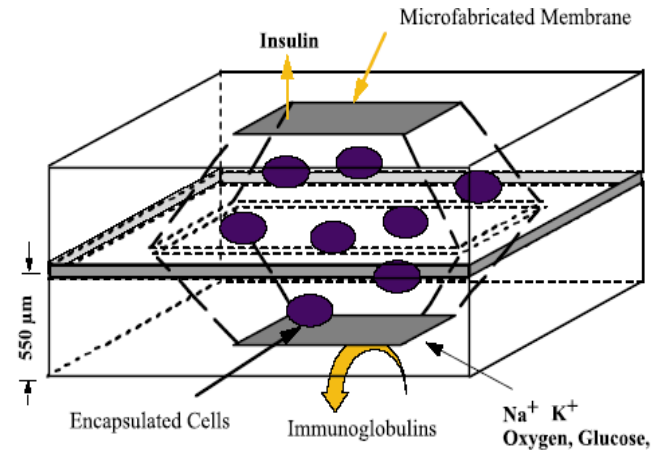


Fig. 1. Schematic of immunoisolation biocapsule which allows nutrient to diffuse freely but excludes immune components.

THANK YOU

