

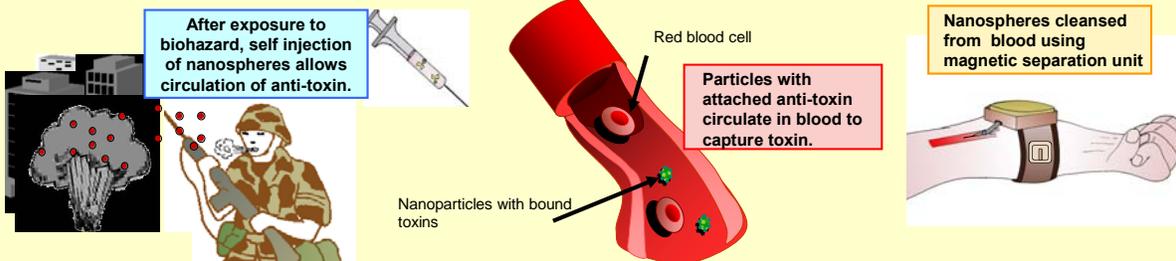
## The use of biodegradable, magnetic nanoparticles for human detoxification

Carol Mertz, M. Kaminski, M. Finck, and M. Arora, Chemical Engineering Division

### Introduction

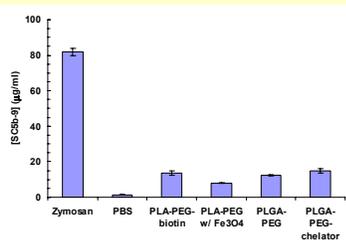
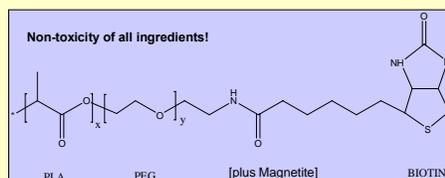
**Tiny engineered nanoparticles** (smaller than red blood cells) are the key to revolutionary technology that could:

- Help detoxify humans following exposure to biological, chemical or radiological weapons
- Provide early treatment
- Decrease side effects of current treatment methods
- Minimize invasiveness versus current treatment options

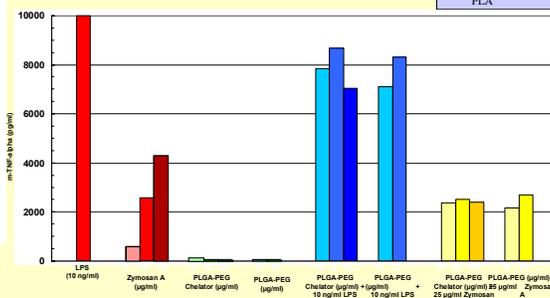


### What are the advantages for using biodegradable magnetic nanoparticles for toxin removal?

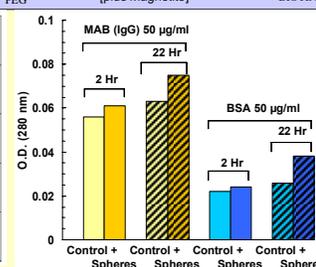
- Provide minimal toxicity (particles use biocompatible, FDA-approved ingredients)
- Avoid immune system due to particles' surface properties
- Efficient toxin removal (high toxin loading and particle removal)
- Rapid removal of toxin (minimizes secondary illnesses and deposition in organs and tissues due to toxin)



Complement Activation Studies:  
Particles do not induce blood clotting or rapid macrophage uptake!



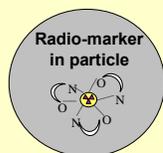
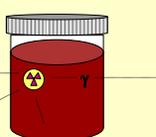
Macrophage Cytokine Release Studies: Particles do not induce macrophage reactions (inflammation)!



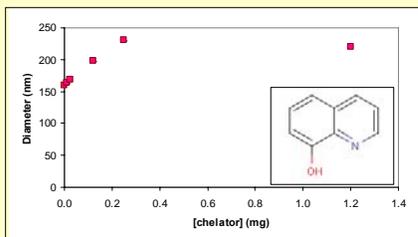
Protein Adsorption Studies: Particles are not identified as foreign!

### How can we track the particles circulating in blood?

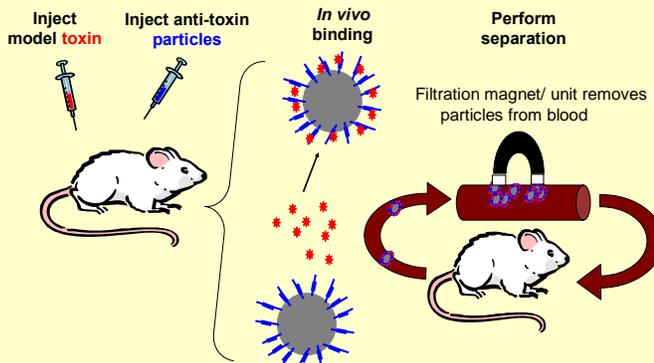
Particles are designed to contain a gamma emitting radioisotope which allows for easy detection of location within blood and organs.



The radioisotope is encapsulated inside the particles with the chelator, 8-hydroxyquinoline. Studies ensure that **particles are not modified with the addition of the radio-marker.**



### Demonstration of Toxin Removal



Rapid kinetics/efficient removal for single contact promises greater removal efficiencies with optimization.

