Nano-bioceramic for gene delivery

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NANYANG TECHNOLOGICAL UNIVERSITY

URECA *Undergraduate Research Experience on CAmpus*

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Nano-Bioceramic for Gene Delivery

1. Introduction

Potential toxicity and immunogenicity surrounding viral methods of DNA delivery have warrant the use of non-viral, synthetic carriers as attractive alternative strategies. This study explored the ability of nano-sized bio-ceramic particles to act as synthetic gene carriers.

2. Materials & Experiments

2.1 The Silica Nano-particle Carrier

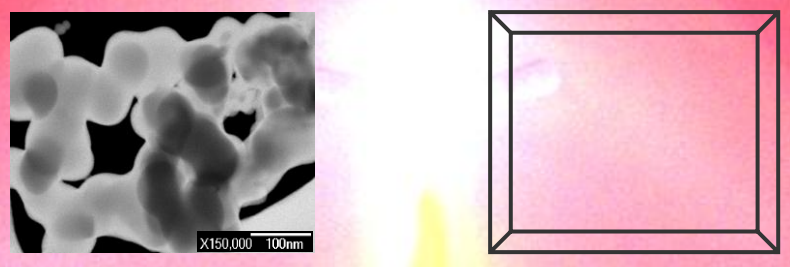


Figure 1. SEM picture of Silica Nano-particle and sample

- Particle manufacture method

  — RF Plasma Spray (bkg picture)

- DNA —PS —Silica Complex

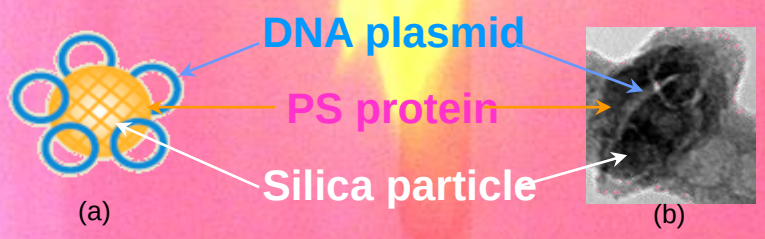


Figure 2. (a) Schematic and (b) TEM picture of complex

2.2 In-vitro Transfection

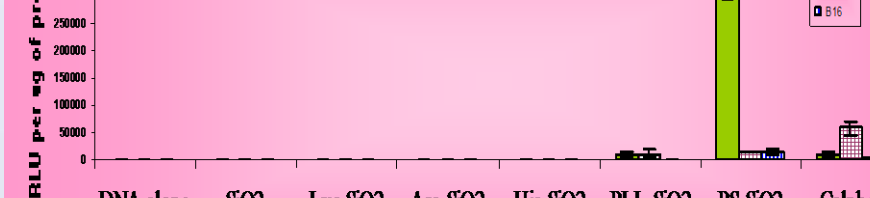
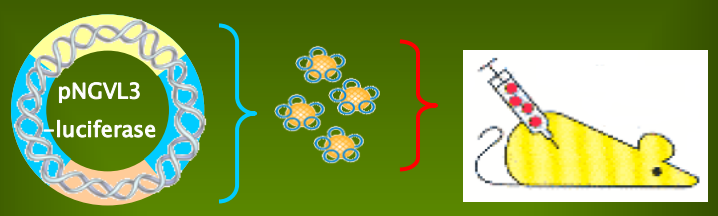


Figure 3. Luciferase Assay Result of Plasmid Expression

2.3 In-vivo DNA Expression

- *Where do the carriers send the DNA to?*

  — Highly specific targeting to Spleen



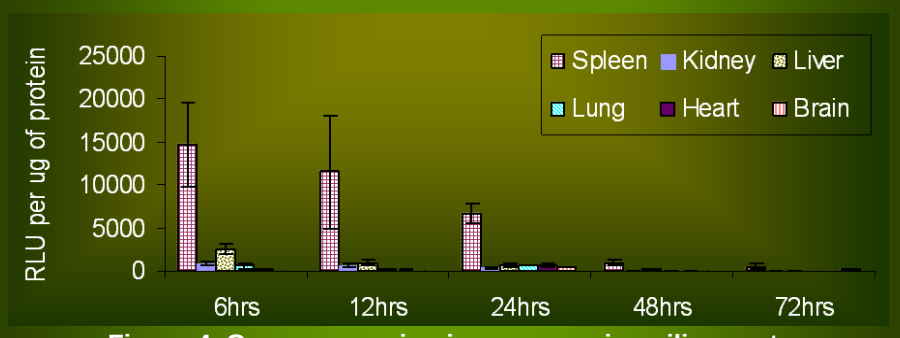
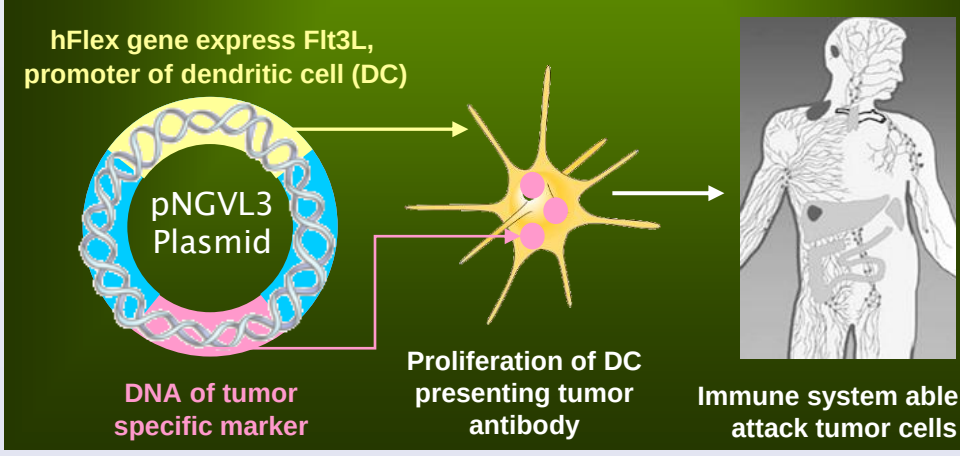


Figure 4. Gene expression in organs using silica vector

- *How does it help in curing diseases?*

  — Gene Vaccine for Cancer Immunity



3. Conclusion & Discussion

Nano-silica particles used as gene delivery vector has the advantages of:

- Absence of viral vectors' immunogenicity problem; lower toxicity compared to polymer and liposome
- High in-vivo transfection efficacy; tissue specific delivery to spleen
- Simple and economical manufacture, able to produce in large quantity

The potential usage of silica nanoparticle in Cancer Vaccine sets an exciting venture for future studies.

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