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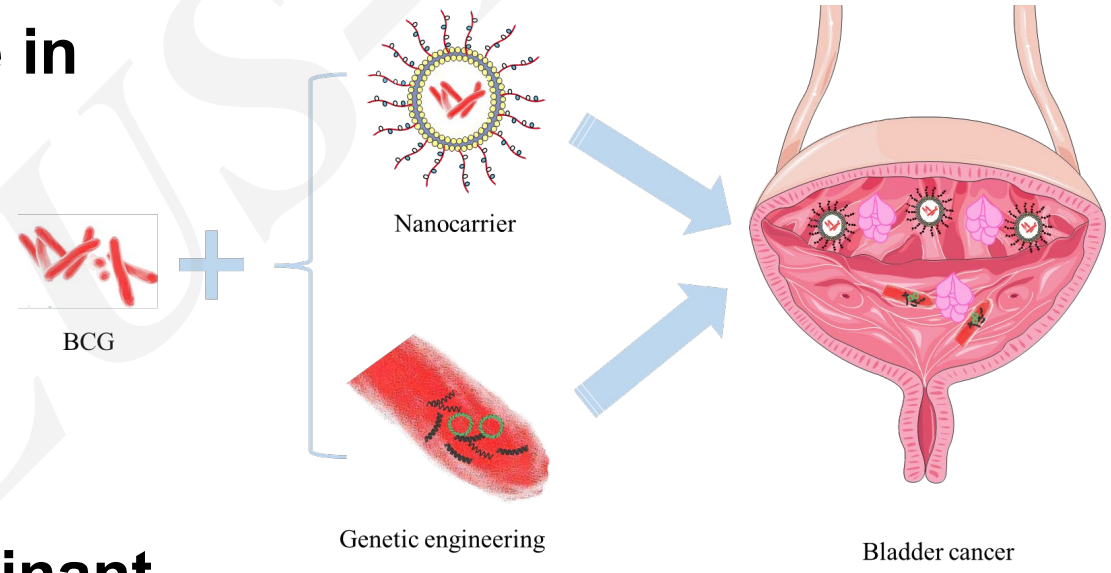
Nano-Bacillus Calmette-Guérin immunotherapies for improved bladder cancer treatment

Key words: Bladder cancer; Bacillus Calmette-Guérin vaccine; Nanocarrier; Genetic engineering; Immunotherapy

Research Summary

This review mainly focused on the development of nano-BCG and genetically engineered BCG for bladder cancer immunotherapy in the following aspects:

- **History and mechanisms of action of BCG vaccine in bladder cancer**
- **Nanocarrier-mediated immunotherapy**
- **Application of recombinant BCG in bladder cancer**



Innovation points

- **An overview** of the development of nano-BCG and genetically modified BCG, as well as the history of BCG therapy.

- **Summary** of the most updated research progress about BCG therapy in improved bladder cancer treatment.

- **Emphasis** of the major advances, applications and the future challenges of nanotechnology and genetic engineering in developing novel BCa therapies.

Innovation points

A series of comprehensive figures were generated to summarize the latest knowledge about BCG immunotherapies.

Figure 1 | Mechanism of action of BCG vaccine for bladder cancer.

Figure 2 | Nanocarrier-mediated immunotherapies.

Figure 3 | Genetic engineered BCG therapy.