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Editorial

An Interesting Similarity of Bacillus Calmette-Guerin and Chimeric Antigen Receptor T Cells

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HIGHLIGHTS

- Relatively BCG and CAR-T cells have the same mechanism of action through immune system activation.
- Suggestion for evaluating CAR-T cell therapy efficacy as a new treatment for bladder cancer.

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ABSTRACT

Intravesical Bacillus Calmette-Guerin (BCG) is approved for non-muscle invasive bladder cancer treatment a long time ago. Chimeric antigen receptor T cells (CAR-Tcell), are T cells are genetically engineered T cells that produce an artificial T-cell receptor for use in immunotherapy. Chimeric antigen receptors are receptor proteins that have been engineered to give T cells the new ability to target a specific protein Its effect is mostly achieved using activating the immune system; the same mechanism proposed likely for chimeric antigen receptor (CAR) T cells. Hence CAR-T cell therapy could be considered for bladder cancer treatment.

Keywords: CAR-T Cell; Bacillus Calmette-Guerin; Bladder Cancer Treatment

Editorial: For the first time, Raymond Pearl hypothesized that mycobacteria may have the potential to be utilized as a cancer treatment. His idea was stemmed from lower rates of cancer in cadavers who had evidence of active tuberculosis (1). In another study, it was shown that mice who intravenously were infected with Bacillus were less susceptible to incident tumors (2), which contributed to identifying tumor necrosis factor (TNF) in the serums of mice (3).

In the light of probable anti-tumoral activity of Bacillus, the value of intravesical Bacillus in bladder cancer without muscular involvement has been investigated and established (4, 5). The mechanism behind the Bacillus role in bladder cancer treatment was evaluated and the role of the immune system has been postulated. Bacillus through activating different components of the immune system including, but not limited to, lymphocytes (CD4+ and CD8+), cytokines, TNF, and natural killer cells lead to bladder cancer treatment (6). In urine samples of patients who were treated with Bacillus Calmette-Guerin (BCG), T cells primarily CD4+ were observed (7). Furthermore, several months following BCG therapy, infiltration of T cells mostly CD4+, in the mucosa of the bladder cancer patients treated with BCG was detected (8).

A promising therapy, namely chimeric antigen receptor (CAR) T cells, for malignancies in particular hematological ones, has been an area of interest in recent studies. CAR-T cells, which are artificial structures, are produced by the expansion and genetic adjustment of peripheral blood T cells (9). Although the mechanism of CAR-T cells is not fully illustrated by far, it has been suggested that stimulation of CD4+ alongside with

CD8+, which leads to cytokines secretion, maintains a mandatory role in the activation of CAR-T cells. In this regard, both CD4+ and CD8+ are equally valuable. Activation of both of them, which is a common phenomenon, leads to cytokines production mainly including TNF α, interleukin5, interleukin13, and interferon γ (10).

We proposed that the mechanism of BCG therapy and CAR-T cells are somehow similar. Since the main mechanism of BCG is based on immune system activation and likely, CAR-T cells result in immune system activation, it can be said that they share the same mechanism. The importance of this point is that if in the next future it will be confirmed that CAR-T cell therapy has the same or higher efficacy and is accompanied by lower rates of complications compared to BCG therapy, they can be used as a suitable substitution for bladder cancer treatment. Therefore, we suggest investigators designed a study to assess the efficacy of CAR-T cells in bladder cancer treatments in animal models.

Conclusions

In the next future it will be proven that CAR-T cell therapy has the same or higher efficacy and is accompanied by lower rates of complications compared to BCG therapy and will take the place of BCG for bladder cancer treatment

Authors' contributions

Two authors contributed equally. All authors reviewed and approved the final version of the manuscript.

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Conflict of interest

All authors declare they have no conflicts of interest.

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Ethical Statements

Not applicable.

Data availability

Not applicable.

Abbreviations

BCG	Bacillus Calmette-Guerin
CAR-T cell	Chimeric antigen receptor T cells
TNF	Tumor necrosis factor

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