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Carbon nanotubes as holy grail aiming imunotherapy in the battle to HIV and Covid-19

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Abstract: Although several infections are challenging to treat, advances in nanobiotechnology allowed the utilization of nanotechnology, for example, nanovaccines. Nanotechnology vaccines based on carbon nanotubes are powerful in enhancing the immunogenicity over a precise antigen, presenting advantages over other adjuvant approaches, such as expanded stability, prolonged release, decreased immunotoxicity, and immunogenic selectivity.

Objective: In this sense, we introduce recent advances in carbon nanotubes (CNTs) used in nanovaccines in order to induce either a carrier effect or an immunostimulatory effect.

Results: CNTs have the potential to model the immune system, providing, between another properties, their adjuvant effects, besides having an excellent carrier effect. Several studies concerning CNT-based nanotechnology vaccines reveal that the immunogenicity related to the vaccine antigen is increased, due to the immunomodulatory and carrier effects related to CNTs. Also, due to the CNTs properties of being able to carry immunogenic molecules, they can act like non-classical vaccines, which aim to have both a molecule-carrier effect and an immunogenic effect, a quality not found in vaccines with traditional formulations.

Conclusions: Adapting and modifying the physicochemical properties regarding CNTs for usage in vaccines may additionally enlarge their efficacy in inducing a T cell-based immune response, fundamental on the battle against several infections as HIV and Covid-19, in the immunotherapeutic process.

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