

Review

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# Why nanodiamond carriers manage to overcome drug resistance in cancer

Veronika Benson<sup>1</sup>, Abbas Amini<sup>2,3</sup>

<sup>1</sup>Institute of Microbiology, Czech Academy of Sciences, Prague 14220, Czech Republic.

<sup>2</sup>Department of Mechanical Engineering, Australian College of Kuwait, Safat 13015, Kuwait.

<sup>3</sup>Center for Infrastructure Engineering, Western Sydney University, Penrith, NSW 2751, Australia.

**Correspondence to:** Dr. Veronika Benson, Institute of Microbiology, Czech Academy of Sciences, Vídeňská 1083, Prague 14220, Czech Republic. E-mail: [benson@biomed.cas.cz](mailto:benson@biomed.cas.cz)

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## Abstract

Nanodiamonds represent an attractive potential carrier for anticancer drugs. The main advantages of nanodiamond particles with respect to medical applications are their high compatibility with non-cancerous cells, feasible surface decoration with therapeutic and cancer-cell targeting molecules, and their relatively low manufacturing cost. Additionally, nanodiamond carriers significantly increase treatment efficacy of the loaded drug, so anticancer drugs execute more effectively at a lower dose. Subsequently, lower drug dose results in less extensive side effects. The carriers decorated with a targeting molecule accumulate primarily in the tumor tissue, and those nanodiamond particles impair efflux of the drug from cancer cells. Therapeutic approaches considering nanodiamond carriers were already tested *in vitro*, as well as *in vivo*. Now, researchers focus particularly on the possible side effects of nanodiamond carriers applied systemically *in vivo*. The behavior of nanodiamond carriers depends heavily on their surface coatings, so each therapeutic complex must be evaluated separately. Generally, it seems that site-specific application of nanodiamond carriers is a rather safe therapeutic approach, but intravenous application needs further study. The benefits of nanodiamond carriers are remarkable and represent a potent approach to overcome the drug resistance of many cancers.

**Keywords:** Nanodiamond, drug carrier, drug resistance, cancer therapy, nanoparticles



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