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Perspective

Antibody Conjugated Nanoparticles

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1. Description

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Antibody Conjugated Nanoparticles (ACNPs) represent a novel strategy for the development of therapies that exploit antibodies to increase the delivery of chemotherapy. A major challenge to clinical development is the direct delivery of chemotherapeutic agents that cause severe toxic effects to patients, which increases the therapeutic index while at the same time reducing off-target side effects. Antibody-conjugated nanoparticles provide great opportunities to overcome these limitations in therapeutics. They combine the benefits provided by nanoparticles with their ability to adhere to their target with high affinity and improve the proliferation of cells given antibodies. Furthermore, antibody-conjugated nanoparticles have been shown to be endogenous by receptor-mediated endocytosis and accumulate in cells undetected by P-glycoprotein, one of the major mediators of multi-drug resistance, resulting in increased intracellular density of drugs. Also, advances in antibody engineering have allowed the specific antibody structure to be manipulated to enhance specificity and functionality and tailoring. This opinion explores recent developments on the active drug target by nanoparticles acting on monoclonal antibodies and captures the potential of these target strategies in the treatment of acute illness.

Nanoparticles themselves provide specific physicochemical properties. The combination of different motions with nanoparticles expands their application fields and gives the new or improved features. Combination of nanoparticles with antibodies combines the properties of nanoparticles with the specific and selective detection capability of antibodies to antigens. Also, improved cellular uptake as well as major intracellular stability may have two main advantages over the use of antibody conjugated nanoparticles. In general, immunoglobulins or antibodies are a group of glycoproteins that make up one of the most important specific defense mechanisms in vertebrates. They all have a very similar structure in Y-shaped bifunctional molecules with two identical domains for antigen recognition (fab fragment) and two identical domains with effect functions (FC fragment). The antigen-binding region is very specific and varies between antibodies. Monoclonal Antibodies (mAbs) can produce large amounts of the same type of antibody they originate from a single cell that divides into a single cell.

Antibody-conjugated nanoparticles can be used primarily in two biomedical applications those are treatment and diagnosis. In treatment, the development of targeted drug delivery suggests major applications of antibody-conjugated nanoparticles, in addition to tissue repair. In diagnosis, applications can be divided into those used *in vivo* and those used in *in vitro* experimentation, and include magnetic resonance imaging (MRI), sensing, cell sorting, biosynthesis, enzyme immobilization, immunoassay, and transfection (transfection), purification and so on. From a therapeutic point of view, antibody-conjugated drug-loaded nanoparticles can select for malignant cells and release large amounts of the drug into the cell cytoplasm, reducing undesirable side effects.

The effectiveness of delivery depends on the ability of each antibody to reach its target in the appropriate quantity and the nanoparticles in the limited quantity trapped by the cell. The idea of attaching a drug-loaded nanoparticle to an antibody for target identification of malignant tissue initiated the development of new target Nano carriers. The need to use Nano capsules (drug-filled interior) depends on the amount of drug that causes cellular death.

In conclusion, at present, nanotechnology is developing rapidly and enormously, with a wide variety of applications being possible, especially in *in vitro* and *in vivo* diagnosis and human therapy. The twentieth century is characterized by the vast expansion of mAbs production for diagnostic and research methods.