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About gene delivery system

Recently, in vivo gene delivery has allowed the study of gene expression and function in animal models via insertion of foreign genes or alteration of existing genes and/or their expression patterns.
The transfection mechanism between transferred DNA or RNA and a cell has been clearly studied and clinical tests for transfection have become easy to carry out using a viral vector.
However, some dangerous adverse effects remain associated with the use of viral vectors. Non-viral gene delivery vectors may be a key technology in circumventing the immunogenicity inherent in viral-mediated gene transfer.
It is expected that non-viral vectors, such as the DEAE-dextran copolymer of this invention , will increase safety by minimizing the incidence of serious diseases resulting from the immunogenicity inherent in viral vectors.

We offer a new class of a polycationic transfection reagent for use as a non-viral gene delivery vector, based on graft-polymerization onto a cationic derivative of a water-soluble linear backbone polymer.
The cationic graft-copolymer of this invention is obtained by graft-polymerizing a vinyl monomer onto a cationic derivative of a water-soluble linear backbone polymer having hydroxyl groups. This specifically designed molecular structure of the cationic graft-copolymer of this invention ensures easy entry of DNA or RNA into cells via the cationic graft-copolymer-DNA or -RNA complex and endosome buffering.
The high efficiency of the cationic graft-copolymer makes it valuable for gene delivery and gene transfer.
A further objective of the invention is to provide a stable and soap-less latex of the cationic graft-copolymer for non-viral gene delivery.
The novel latex of the cationic graft copolymer of the invention is a stable soap-less type and is prepared by

graft-polymerizing a vinyl monomer onto a cationic derivative of a water-soluble linear polymer having hydroxyl groups using tetravalent ceric ions in water. The resultant latex having strong adsorbing properties with proteins and nucleic acids, such as DNA and RNA, in its anionic region due to the cationic properties and the hydrophobic domain of the graft-copolymer is able to specifically adsorb proteins or nucleic acids by changing pH and ion strength.

1) DEAE-Dextran-MMA Graft Copolymer for Non-viral Delivery of DNA,
Jorgenson, Lene Nielson, Hanne Morck, Ed., Delivery Technologies for Biophar maceuticals,
John Wiley & Sons,West Sussex UK(November 2009)

2) DEAE-Dextran and DEAE-Dextran-MMA Graft Copolymer for Nanomedicine
Polymers Research Journal vol. 3, issue 3-4,415-453(2010)