A NOVEL POLYMER BASED GENE DELIVERY SYSTEM FOR TRANSGENESIS

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CONTENT

This study contains the synthesis and characterization of novel biocompatible Poly(β-aminoester) compounds (PBAE) and nanoparticles (nPBAE), their cytotoxicity tests and their *in vitro* application for transgenesis.

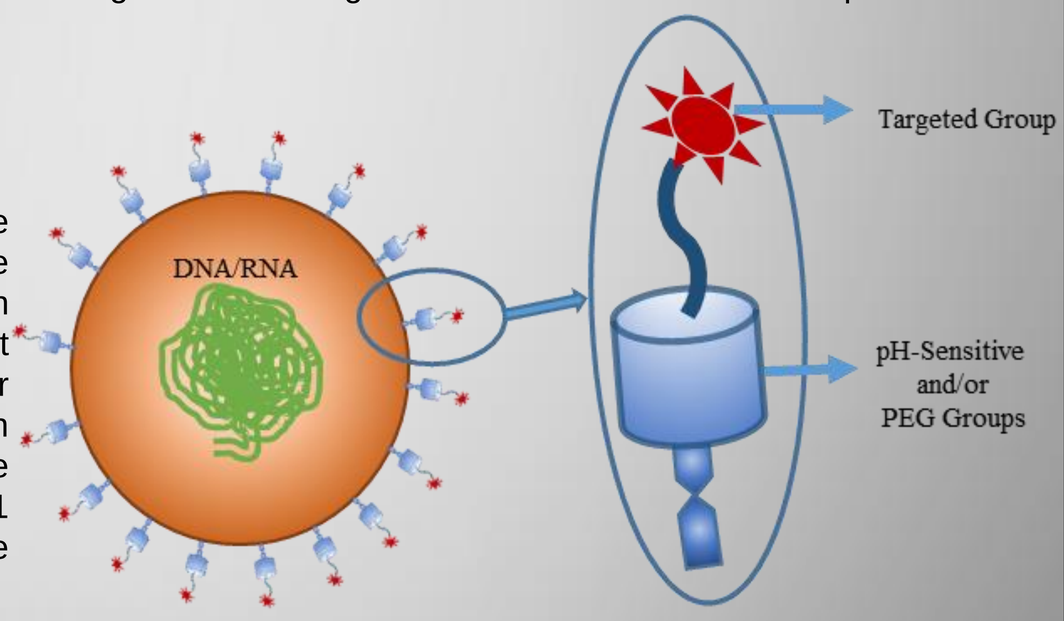
Keywords: Transgenesis, polymeric non-viral vector, poly(β-aminoester), transgenic cationic polymers

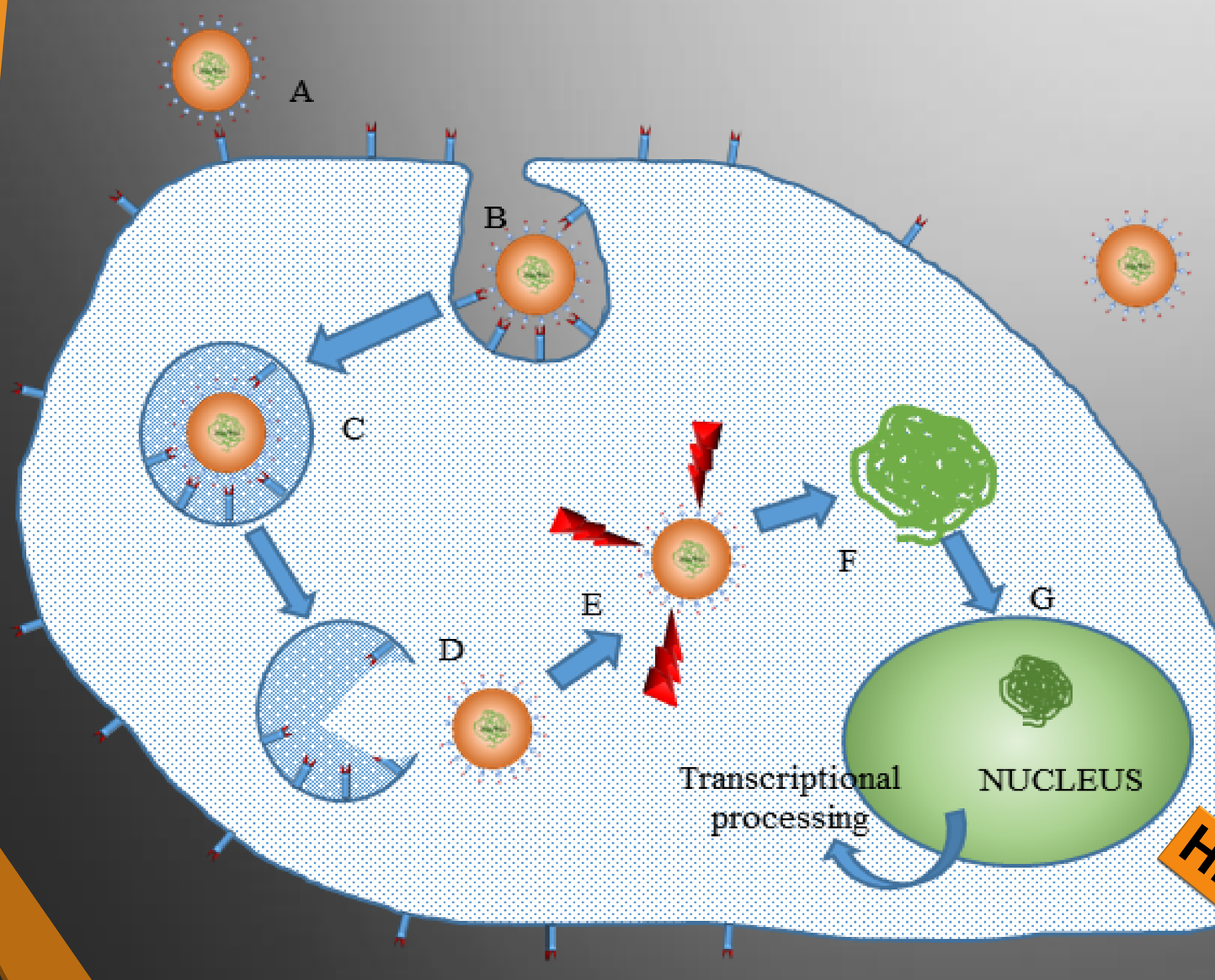
INTRODUCTION

Nowadays, gene therapy is the important especially for the treatment of genetic diseases, cancer, cardiovascular diseases and viral infection via transferring the genetic materials to the targeted area of the patient. Transfection (gene transfer) is the transfer of a gene to the nucleus of another cell via various methods, such as electroporation, gene microinjection, gene carrier systems which are viral or non-viral vectors. The some transgenic cationic polymers such as synthetic (polyethylene imine, poly(amido amines, poly(β-aminoesters) etc.) and natural (poly(aminoacids), chitosan, gelatin etc.) as non-viral vectors are preferred in gene delivery. The main reasons for generally preferring of PBAEs in gene transfer are that it can be protonated in physiological pH and it does not display any significant toxicity *in vivo* applications.

METHOD

In this study, PBAE and its nanoparticles (nPBAEs) with desired characteristics were synthesized by the reaction of ethylenediamine and bisphenol-A-etoxylate diacrylate and characterized. The complex formation of nanoparticles with pDNA (i.e. green fluorescence protein gene; GFP) in different ratios (w/w) are carried out via different method as ionic interactions (ignPBAEs) or encapsulation (egnPBAEs). Primer Ovine Fibroblasts (POF), Primer Ovine Embryonic Fibroblasts (POEF) and Human Embryonic Kidney (HEK293) Cells were used for the transfection tests. The transfection efficiency of the nanoparticle was analyzed by using Olympus IX71 reverse microscope under 460-480 nm fluorescence light that was emitted by the protein coded by pDNA.

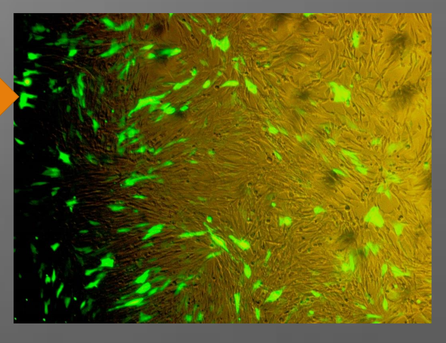




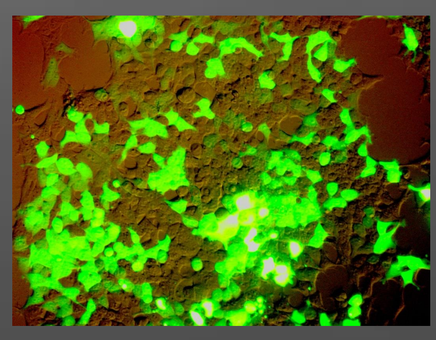
RESULTS AND DISCUSSION

According to all results, the transfection efficiencies of ignPBAE and egnPBAE were assayed in HEK293, POF and POEF cells. The transfection efficiency of egnPBAE formulation is the highest in HEK293 and POF cells. In the case of where the cell number was 20.000, the polymer:pDNA ratio was 5:1 to 10:1, the amount of pDNA was 0,5 to 2 µg and the degree of transfection efficiency was 5. It was observed that egnPBAE formulation are more effective than ignPBAE.

POF



HEK293



This work was supported by the Research Fund of Istanbul University, Project Numbers 31781 and 7383. Nanoparticles formulation which was developed to be a patent applied the Turkish Patent Institute (09.09.2014-2014/10603) and European Patent Office (09 September 2014–EP14184166.8)