

Anion exchange chromatography of 4.2 kbp plasmid based vaccine (pcDNA3F) from alkaline lysed E. coli lysate using amino functionalised polymethacrylate conical monolith

Abstract

New strategies to economically manufacture large quantities of vaccines in less time are greatly needed to cater for the increasing global human population. This study aimed at developing a strategy to efficiently manufacture a highly purified plasmid vaccine via anion exchange monolithic chromatography. Diethylamine and triethylamine were used to provide the functional groups for polymethacrylate monoliths and used in anion exchange chromatography of plasmid pcDNA3F. Five chromatographic settings as described in the first table of this article were studied and it was concluded that the triethylamine functionalised conical monolith combined with optimum buffers' and pH conditions produced the highest quality of pcDNA3F. Plasmid yield (3003.55 mg/L), plasmid recovery (90.25%), protein (0.01 mg/L), LPS (0.12 EU/mg) with no detectable gDNA and RNA were obtained at a low NaCl concentration of 0.25 M. Apparently, this technology will have a great impact on the overall plasmid vaccine production and particularly on the development of axial flow monolithic plasmid vaccine purification.