Electronic supplementary data

Grafting zwitterionic polymer chains on PEI as a convenient strategy to enhance gene delivery performance

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Calculation of mass percentage of PMPC in PEI-PMPC polymers:

The mass percentage of PMPC is defined as follows:

\[ MPC\% = \frac{m_{MPC}}{m_{MPC} + m_{PEI}}\times 100\% \quad (1-1) \]

The integral area of H_d, H_e and H_c was normalized as 6. So the integral area of H_g equals to 9/6 multiplied by the integral area of H_d, H_e and H_c. The molecular weight of MPC is 295. The molecular weight of each repeat unit of PEI is 43. And each repeat unit of PEI contains four protons.

The equation for calculation is shown as follows:

\[ MPC\% = \frac{m_{MPC}}{m_{MPC} + m_{PEI}}\times 100\% = \frac{295}{\frac{S_{PEI,g}}{4} + \frac{9}{6} S_{d,e,c} \times 43 + 295} \quad (1-2) \]

\[ = \frac{295}{\frac{S_{2.30-3.65}}{4} - \frac{9}{6} S_{4.0-4.5} \times 43 + 295} \times 100\% \]

For example, the calculation for the PEI-PMPC_6% is given below:

\[ MPC\% = \frac{295}{\frac{S_{2.30-3.65}}{4} - \frac{9}{6} S_{4.0-4.5} \times 43 + 295} \times 100\% = \frac{295}{\frac{(450.9 - 9)\times 43}{4} + 295} \times 100\% = 5.85\% \]

The mass percentage of PMPC in the polymer sample was estimated as 5.85%, and the sample was referred to as PEI-PMPC_6%. The mass percentage for PEI-PMPC_{11}\% and PEI-PMPC_{24}\% were estimated similarly.
Figure S1. $^1$H NMR spectrum of PEI-PMPC$_{6\%}$ (in D$_2$O)

Figure S2. $^1$H NMR spectrum of PEI-PMPC$_{11\%}$ (in D$_2$O)
Figure S3. $^1$H NMR spectrum of PEI-PMPC_{24}\% (in D$_2$O)
**Figure S4.** Buffering capacity of PEI 25K and three PEI-PMPC polymers determined by performing acid–base titration from pH 10 to pH 3
Hela:

PEI 25K, no serum, N/P=10:1

PEI 25K, 10% serum, N/P=10:1

PEI-PMPC11%, no serum, N/P=10:1

PEI-PMPC11%, 10% serum, N/P=10:1
Hela:

**PEI-PMPC\(_{11\%}\), no serum, N/P=20:1**

![Graph 1](image1)

**PEI-PMPC\(_{11\%}\), 10% serum, N/P=20:1**

![Graph 2](image2)

**PEI-PMPC\(_{11\%}\), no serum, N/P=30:1**

![Graph 3](image3)

**PEI-PMPC\(_{11\%}\), 10% serum, N/P=30:1**

![Graph 4](image4)
HepG2:

- PEI 25K, no serum, N/P=10:1
- PEI 25K, 10% serum, N/P=10:1
- PEI-PMPC_{11\%}, no serum, N/P=10:1
- PEI-PMPC_{11\%}, 10% serum, N/P=10:1
- PEI-PMPC_{11\%}, no serum, N/P=20:1
- PEI-PMPC_{11\%}, 10% serum, N/P=20:1
HepG2:

**Figure S5.** Typical flow cytometry profiles for pEGFP transfection in HeLa and HepG2 cell lines mediated by PEI 25K and PEI-PMPC$_{11\%}$ with or without serum.