**Supplemental material**

**Table S1．Characteristics of PEs (*n* = 3).**

|  |  |  |  |
| --- | --- | --- | --- |
| Formulations | mean diameter(nm) | PDI | zeta potential(mV) |
| 10 mol% PE | 127.5 ± 3.9 | 0.16±0.02 | -30.15 ± 2.90 |
| 30 mol% PE | 122.1 ± 3.6 | 0.13±0.01 | -26.03 ± 2.49 |
| 50 mol% PE | 124.3 ± 2.1 | 0.15±0.01 | -21.31 ± 2.84 |
| PE-DSPG-2 | 129.0 ± 5.7 | 0.14±0.02 | -35.64 ± 3.36 |
| PE-DSPG-5 | 126.9 ± 5.3 | 0.13±0.03 | -37.87 ± 3.09 |
| PE-DSPG-9 | 127.1 ± 3.2 | 0.17±0.02 | -41.54 ± 4.29 |
| PE-DSPG-15 | 124.2 ± 5.4 | 0.12±0.01 | -45.57 ± 4.08 |
| PE-DSPG-30 | 128.6 ± 3.4 | 0.15±0.02 | -49.32 ± 5.30 |
| 10 mol% PE-DSPG | 127.1 ± 3.2  | 0.19±0.01 | -41.54 ± 4.29 |
| 30 mol% PE-DSPG | 122.3 ± 4.6 | 0.16±0.02 | -33.64 ± 4.76 |
| 50 mol% PE-DSPG | 119.5 ± 4.1 | 0.11±0.03 | -28.54 ± 2.32 |

**Table S2. The main pharmacokinetic parameters of PE modified with different densities of PEG(*n*=3), PE-DSPG with different densities of PEG (*n*=3) and PE-DSPG with different content of DSPG(*n*=3).**

|  |  |  |
| --- | --- | --- |
| Groups | T1/2 (h) | AUC(0-8h) (µg/mL·h) |
| 10 mol% PE | 3.28 ± 0.19 | 345.200 ± 18.9 |
| 30 mol% PE | 3.60 ± 0.17 | 373.17 ± 4.5 |
| 50 mol% PE | 5.03 ± 0.57 | 409.00 ± 5.62 |
| 10mol% PE-DSPG | 3.50 ± 0.21 | 370.7 ± 9.00 |
| 30mol%PE-DSPG | 3.83 ± 0.25 | 373.00 ± 14.7 |
| 50mol%PE-DSPG | 5.69 ± 0.53 | 448.4 ± 5.62 |
| PE-DSPG-2 | 3.39 ± 0.12 | 350.13 ± 3.55 |
| PE-DSPG-5 | 3.34 ± 0.16 | 346.47 ± 4.45 |

|  |  |  |
| --- | --- | --- |
| PE-DSPG-9 | 3.49 ± 0.22 | 365.77 ± 17.18 |
| PE-DSPG-15 | 3.49 ± 0.20 | 344.87 ± 1.36 |
| PE-DSPG-30 | 3.42 ± 0.14 | 340.23 ± 7.9 |