

MicroRNA-releasing lipoplexes as potential nanosystems against COVID-19

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Coronavirus disease 2019 (COVID-19) has become a global pandemic. Currently, in the lack of COVID-19 treatments and vaccines, the therapeutic potential of microRNAs as anti-viral can be exploited. Here, we developed new miRNA-loaded lipoplexes for efficient encapsulation and gradual miRNA release as nanosystem against COVID-19. Lipoplexes containing negmiR were formulated at different N/P ratios from 3.0 to 0.35 showing encapsulation efficiency of 99%, an average hydrodynamic diameter ranging from 372 nm to 876 nm and an average zeta potential ranging from +40 mV to -26 mV by decreasing the N/P ratios. Based on stability experiments at different temperatures, lipoplexes with 3 N:P ratio was selected for *in vitro* test, showing biocompatibility and efficient *in vitro* miRNA release, as compared to a commercial agent. In conclusion, new lipoplexes were developed showing efficient miRNA delivery to cells. In future, miRNA-loaded lipoplexes will be evaluated as potential therapeutic nanosystems against COVID-19. This project is supported by the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 772168).