

bility of glassy solids can be achieved when T_g is 50 °C above the storage temperature [127]. In contrast, subsequent studies by Yu and Anchordoquy [276] showed that formulations possessing comparable moisture contents (~1.9%) maintained lower levels of TBARS and higher SC content than those containing lower levels of moisture (~0.4%). Despite these initial efforts, no correlation has been found between the changes in RM with time and the physicochemical and biological activity upon storage in lipid/DNA-based pharmaceuticals [276, 279]. Therefore, future studies should explore the effect of moisture contents in different lipoplex compositions (alone or in combination with the aforementioned strategies) in order to better define the optimal moisture content range for storage.

Conclusions

In conclusion, lyophilization is considered a suitable tool to preserve nonviral vectors in the dried state. Nucleic acid- and lipid-based formulations have been shown to undergo oxidative damage (generation of ROS, loss of SC) in the dried solid, and these species have been associated with the instability of formulations during storage. Studies have demonstrated that nucleic acid-based formulations can be preserved in trehalose as dehydrated preparations when chelators (DTPA) and/or antioxidants (α -tocopherol) are included in the formulation. In addition, our studies have clearly shown that naked DNA is relatively stable, and that the lipid component is more prone to oxidation during storage. Considering the growing interest in the development of more efficient and stable nonviral vector systems, studies focusing on the stability of more advanced lipid/nucleic acid (DNA; oligodeoxynucleotides, ODNs; siRNA) compositions are needed to achieve shelf lives similar to other biopharmaceuticals (24 months).

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