Cell penetrating peptides (CPPs) have been recognized as promising tools for the delivery of different therapeutic molecules. Previous studies in our laboratory have shown that the S4\textsubscript{13}-PV peptide accumulates inside cells very efficiently through a rapid, dose-dependent and non-toxic process, which is not dependent on cell fixation.

In the present work, we aim to evaluate the potential of the S4\textsubscript{13}-PV peptide to mediate the intracellular delivery of plasmid DNA, \textit{in vitro}. The ability of the S4\textsubscript{13}-PV peptide to mediate gene delivery \textit{per se}, or in association with cationic liposomes, was evaluated both in dividing (TSA and HeLa cell lines) and non-dividing cells (neuronal primary cultures). The efficiency of transfection of the different formulations was assessed by measuring the levels of luciferase activity. Our results indicate that maximal transfection is achieved upon addition of cationic liposomes to pre-formed peptide/plasmid DNA complexes. Overall our results suggest that formulations based on the S4\textsubscript{13}-PV cell penetrating peptide present great potential for the delivery of plasmid DNA to both dividing and non-dividing cells, which may prove useful for gene-based therapies.