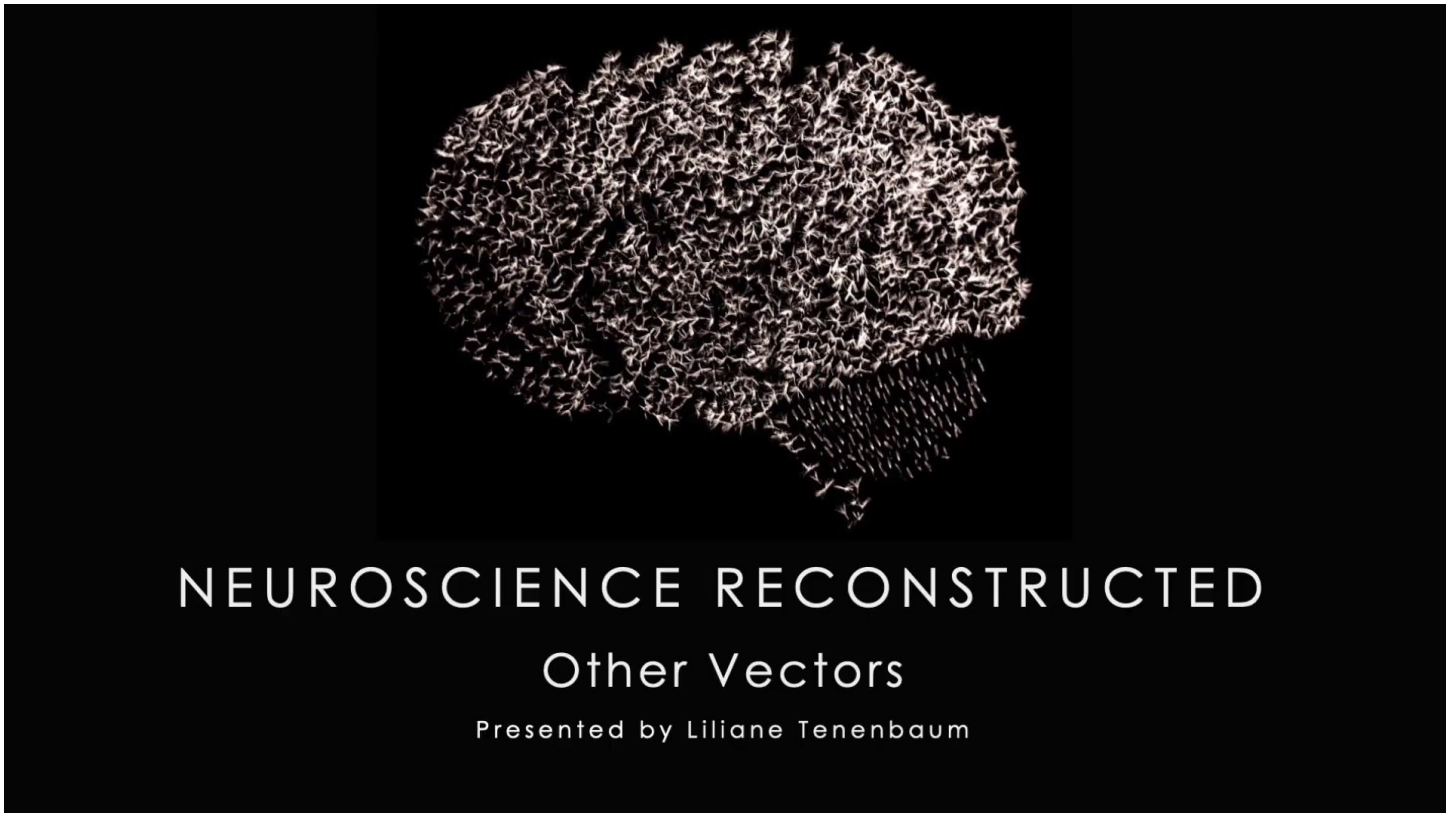

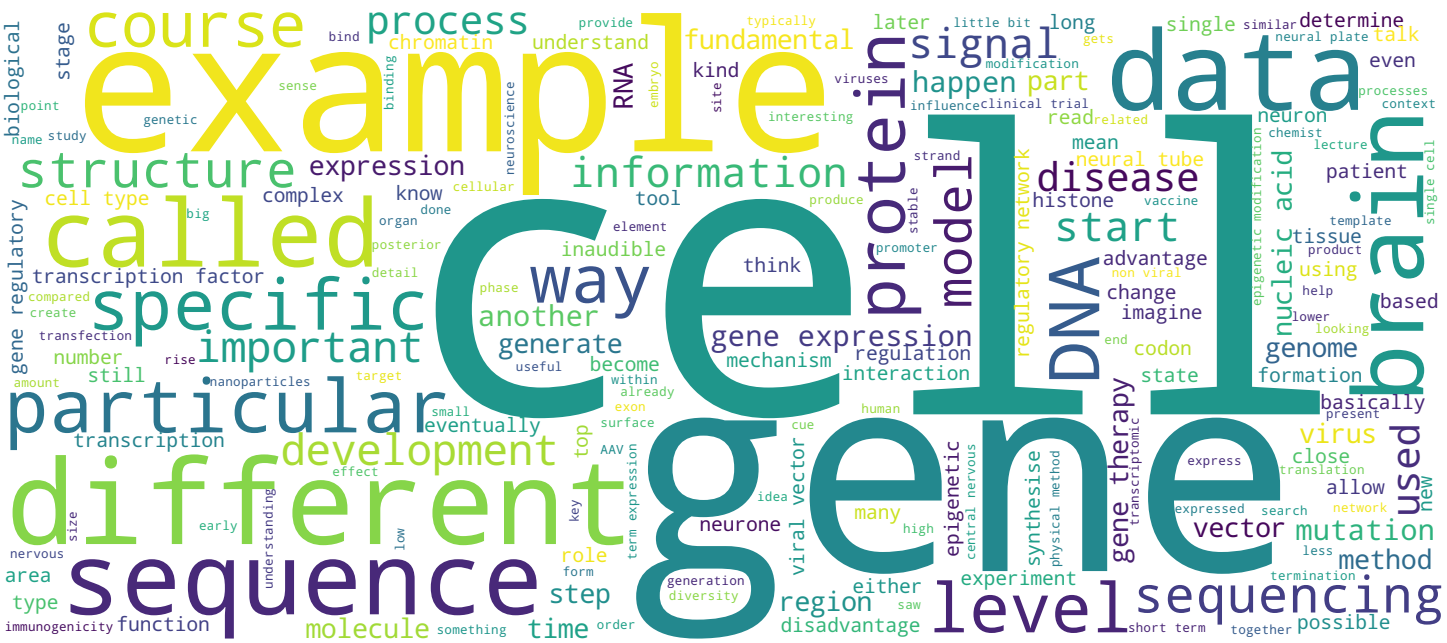

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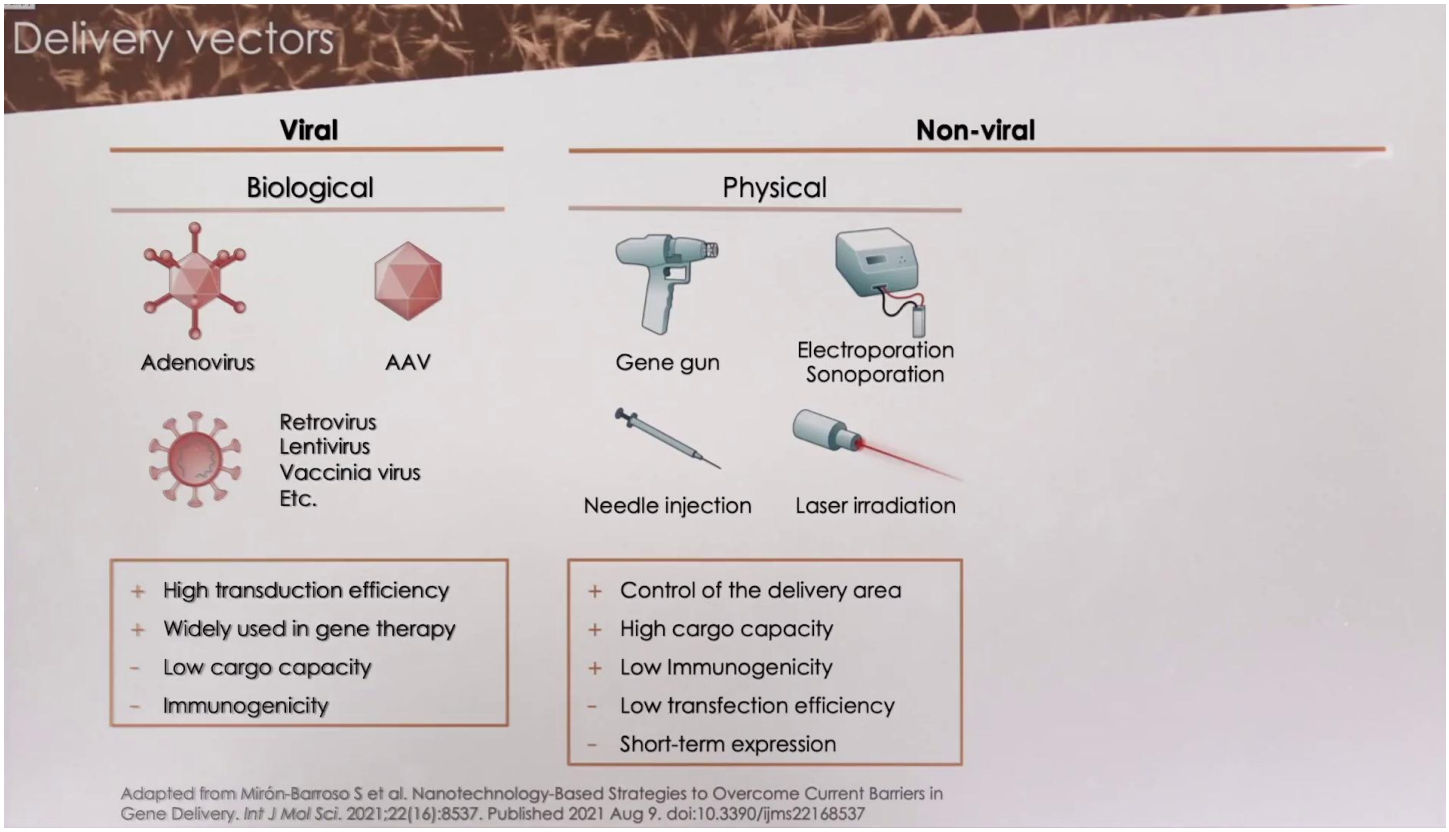
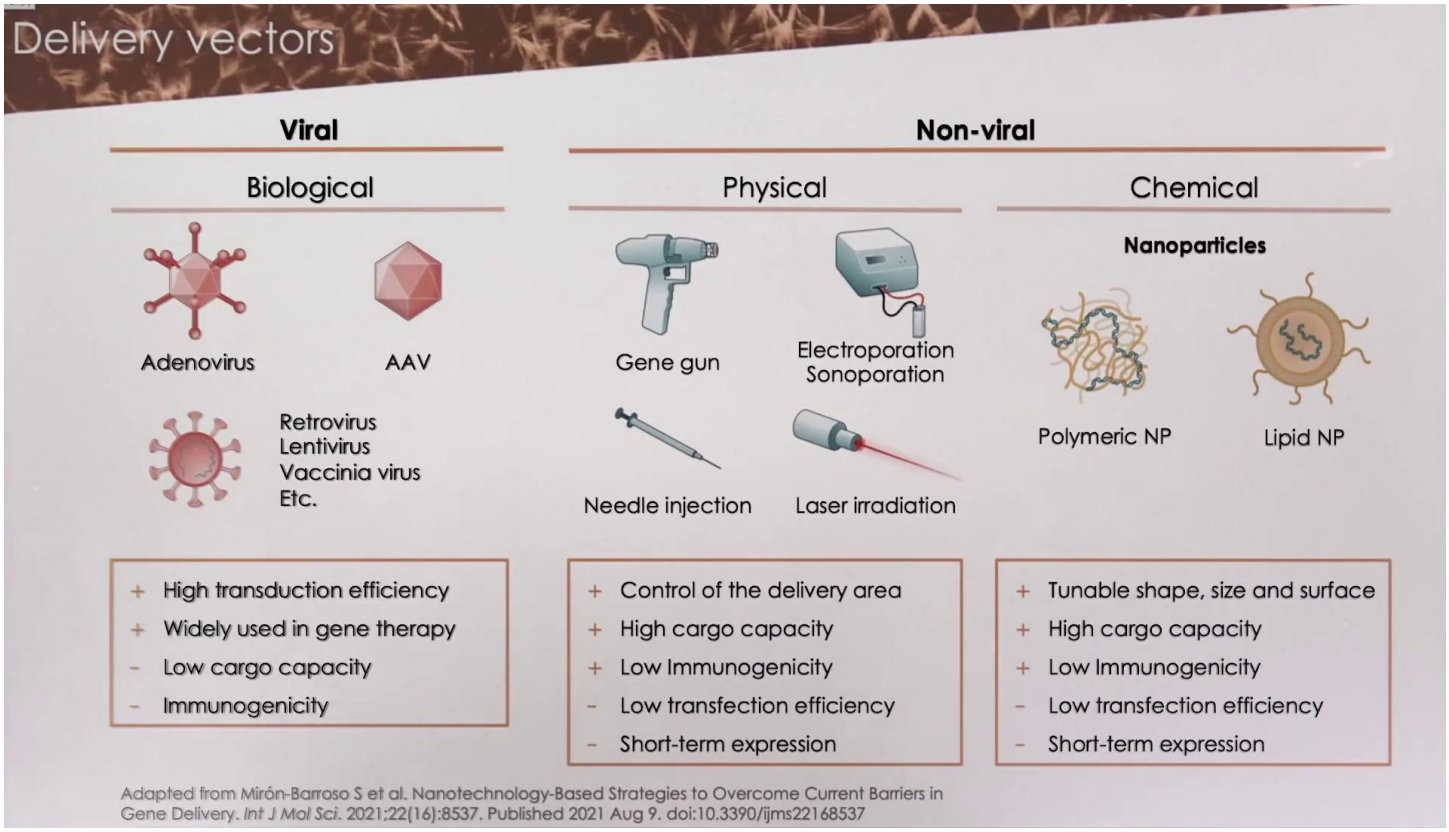


Besides the viral vectors, there have been important developments in so called non-viral vectors. In this case, the method to deliver the nucleic acid can be either a physical method. It can be a simple injection of naked material using a needle. The passage of the cell membrane can be enhanced by an electric shock or another physical shock. However, there are also disadvantages of this method. For the advantage, as compared to viruses, is that you can very precisely control the delivery area when a virus will diffuse into the tissue, will diffuse away from the injection side. The nucleic acids delivered by these physical methods will remain very close to the delivery site. They have a high cargo capacity. As long as you can synthesise it, you can inject very large sequences. The immunogenicity is much less a problem since you don't have proteins. But the main disadvantage is that the transfection... Now we talk about transfection and not transduction. The transfection efficiency is really very low, up to no, and the expression is short-term. It's not stable because the nucleic acid will be degraded by DNAs or RNAs, so still under development.

Notes

Summary

0m 05s



Now, there are also chemical methods to deliver genetic material and you probably heard already a lot about nanoparticles that have been used for vaccines. These nanoparticles are synthesised by chemists. They can be polymeric nanoparticles or lipidic nanoparticles. The advantage is that the chemist can imagine all kinds of molecules and this they can adapt the shape, the size, and the surface, for example, the ionic strength, depending on the organ that they want to target. Again, the sequences are virtually no limit as long as you can synthesise it. The immunogenicity is much lower than the virus, of course. But again, the disadvantage are a low transfixion efficiency and a short-term expression. This is not a problem for a vaccine, but for gene therapy, in particular for neurological diseases that are slowly progressing diseases, you need to have a long-term expression, ideally a lifelong expression. At this stage of development, the non-viral methods will not be very useful for gene therapy into the central nervous system.

Notes

Summary

2m 16s