The role of miRNAs in Veterinary Neurology: diagnostic and therapy.

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Faculty of Veterinary Medicine - Final degree project, June 2020

Introduction

MicroRNAs or miRNAs are non-coding small RNA molecules of about 19-24 nucleotides that function as post-transcriptional regulators of gene expression. They participate in many physiological and pathological processes ranging from embryonic development to neoplastic progression.

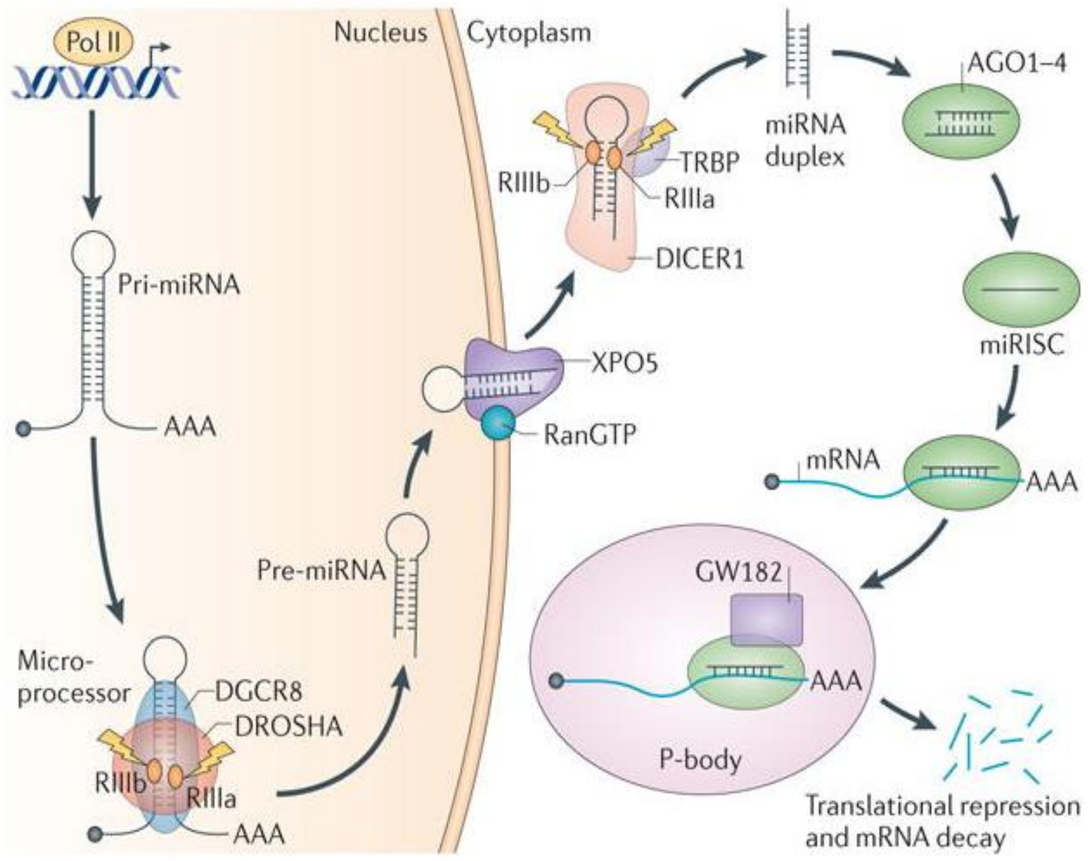


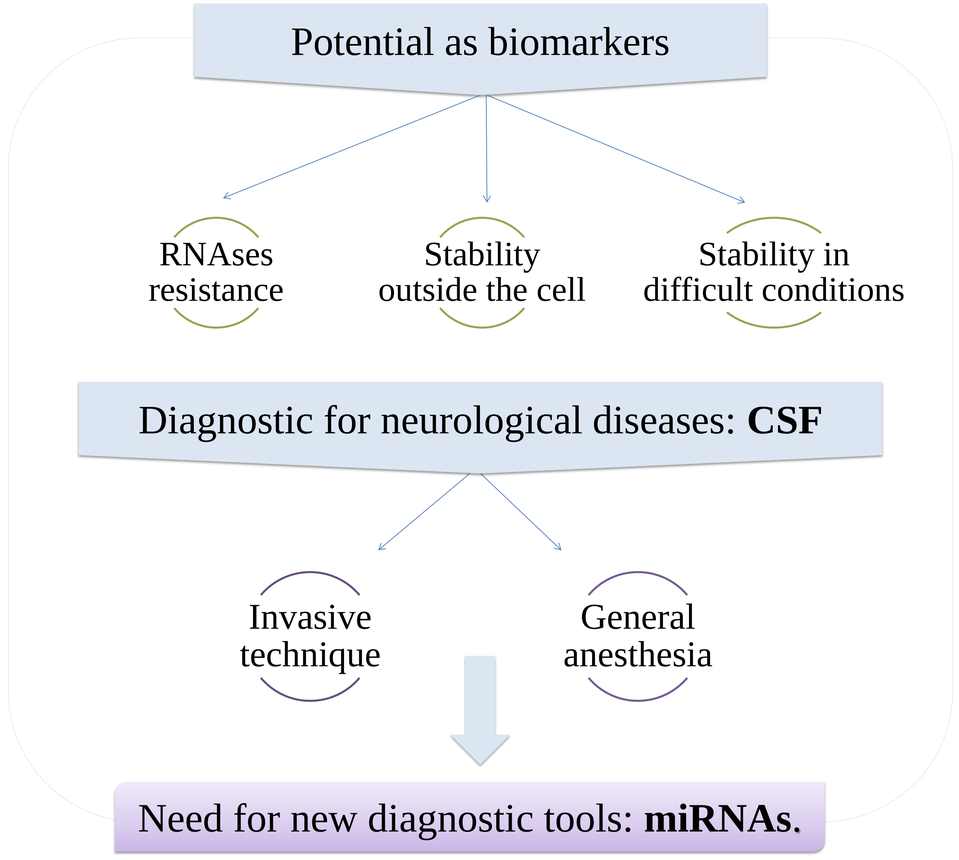
Figure 1. Overview of miRNA biogenesis pathway (Lin and Gregory 2015).

Table 1. Main studies of miRNAs in veterinary neurology

Marioni-Henry et al. (2018)	Seven miRNAs were consistently expressed in dogs with neurological disorders one of which highly related to the neoplastic group.
Vansteenkiste et al. (2019)	Two miRNAs had increased expression levels in the CSF and six miRNAs had decreased expression levels in dogs with Wobbler syndrome. It represents an initial characterization of the miRNA profile of normal canine CSF.
Cirera et al. (2019)	Failed to reproduce consistent results in CSF samples due to several reasons.
Nakata et al. (2019)	Plasma miR-26b is a potential novel diagnostic biomarker of degenerative myelopathy (DM).
Narita et al. (2020)	miR-15b and miR-342-3p have potential as noninvasive biomarkers for differentiating glioma from other intracranial diseases in dogs.

Objectives

- To define what microRNAs are and their functions.
- To describe the role of microRNAs in different diseases.
- To describe the role of microRNAs in diagnosis and treatment in veterinary neurology, focusing on dogs.



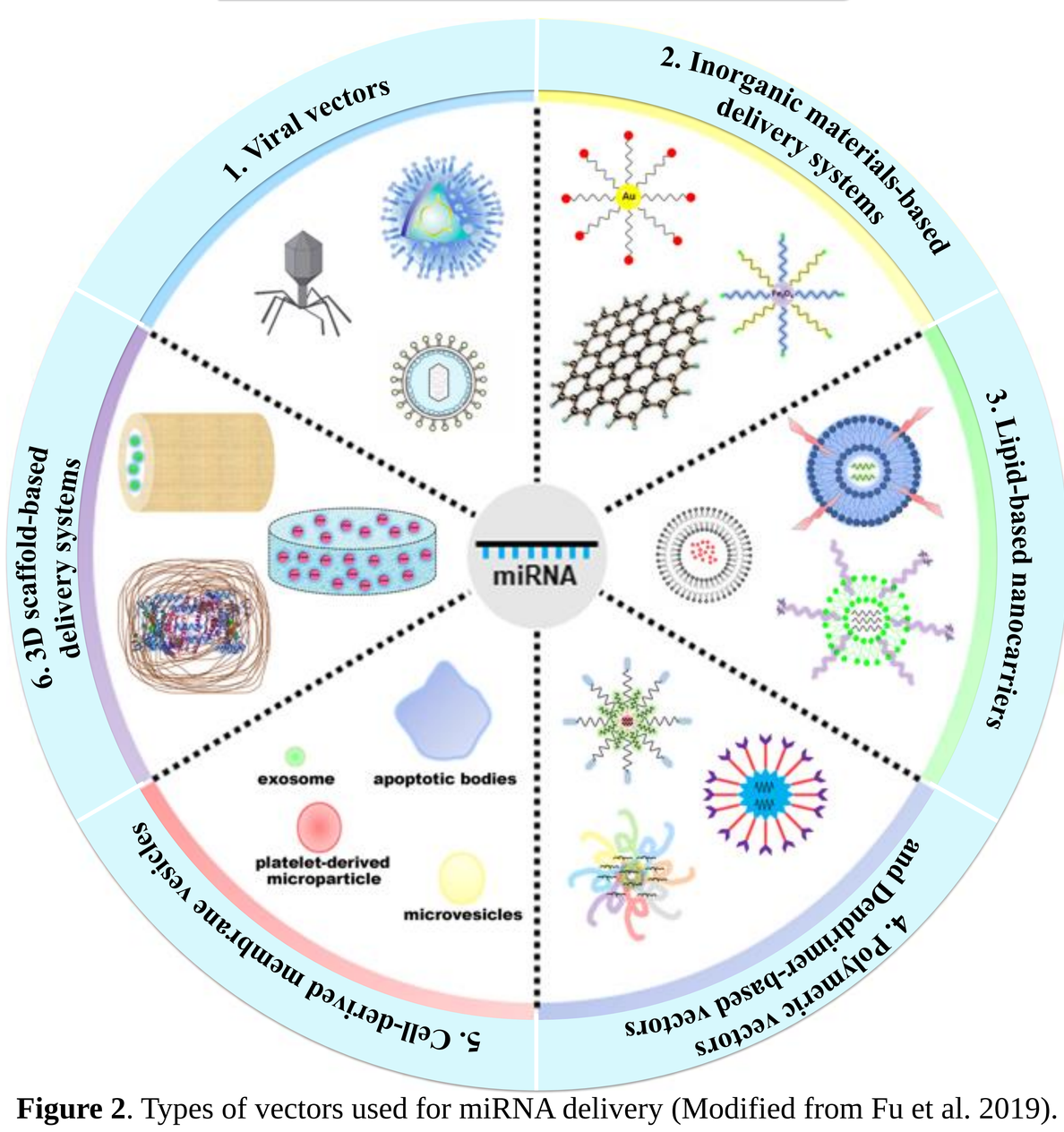


Figure 2. Types of vectors used for miRNA delivery (Modified from Fu et al. 2019).

Conclusions

- miRNAs are involved in a wide variety of processes and diseases.
- They offer a great potential as biomarkers for the diagnosis of neurological diseases having already been related to certain diseases. The therapeutic potential is clear, but many challenges remain such as crossing the blood-brain barrier and avoiding possible side effects.
- This is a fairly new field in veterinary medicine and should therefore be more deeply studied and researched to reach the point where it can be applied to the daily practice.