

The Role of Extracellular Vesicle miR-16-5p in Mediating Long-Term Effects of Childhood Trauma

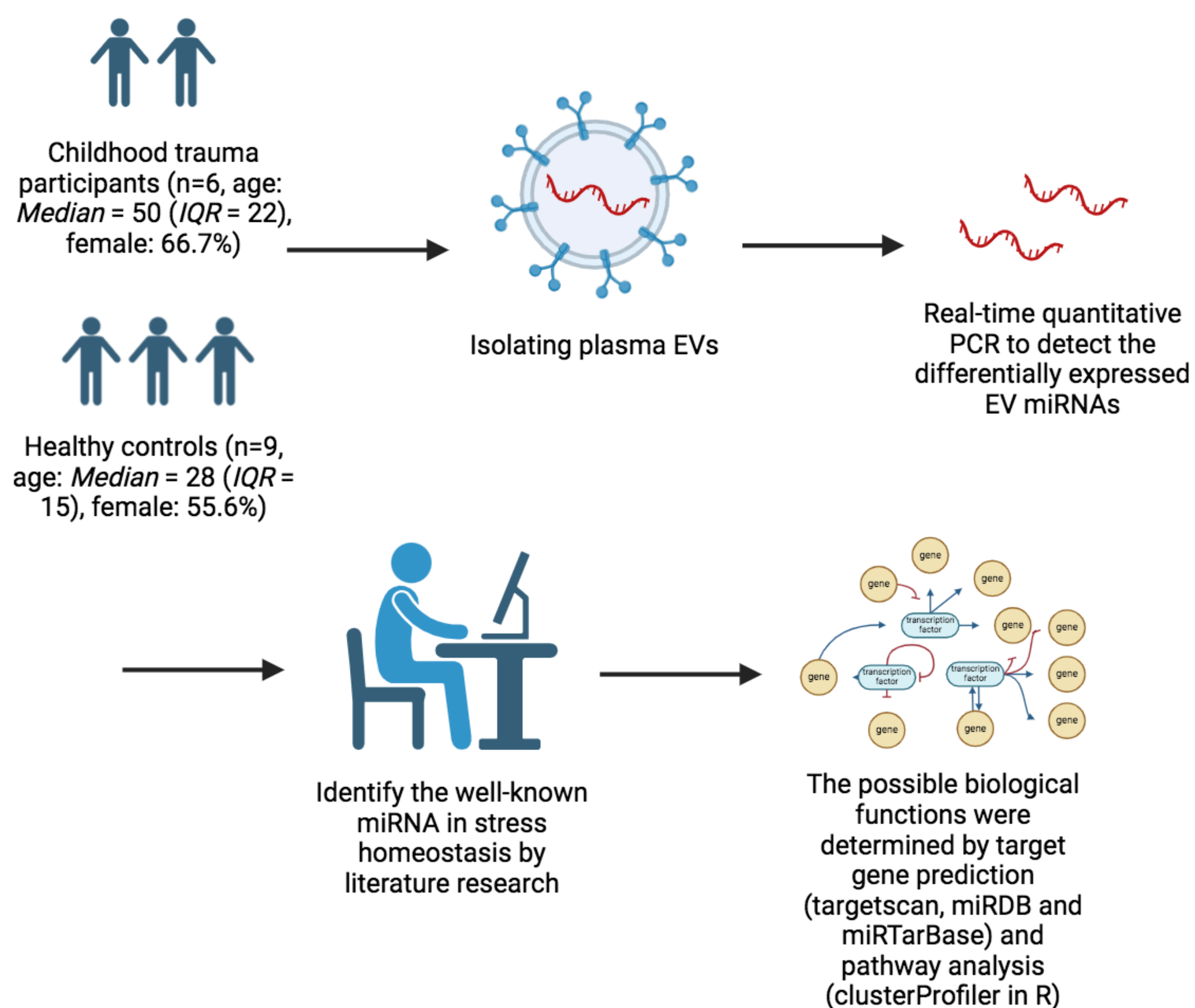
INTRODUCTION

- Early life stress (ELS), affects metabolism, neurotransmitter systems, immune response, and brain development, potentially leading to anxiety, depression, and other mental health issues later in life¹.
- Extracellular vesicles (EVs) might play a role in how ELS affects the body by participating intercellular communication, e.g. through their microRNA (miRNA) cargo².

AIM

- The aim of this study was to analyze whether childhood trauma, a form of ELS, affects EV miRNAs and thereby the potentially the body, even at later stages in life.

METHOD



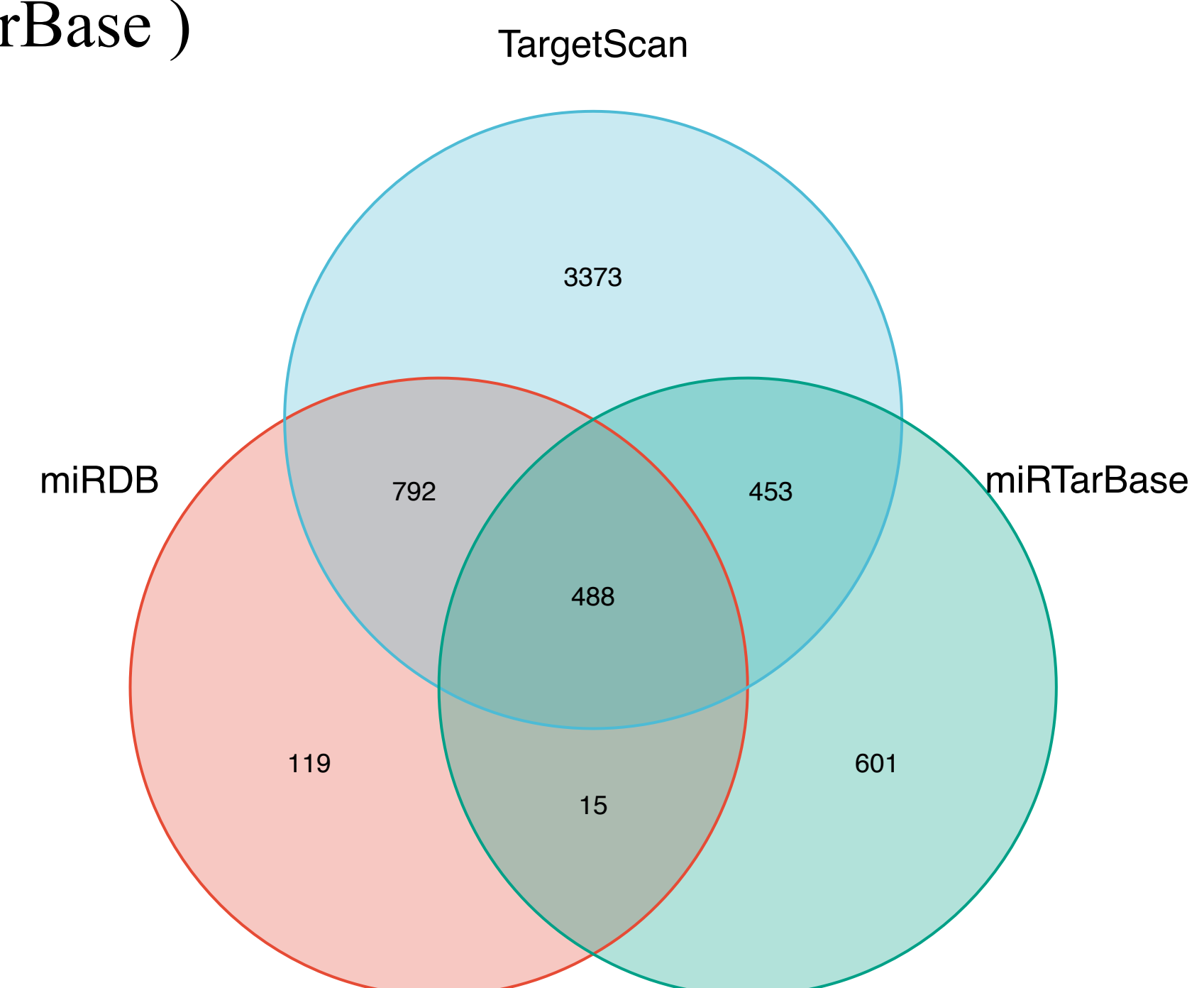
RESULTS

- Differentially expressed EV miRNA between childhood trauma participants and healthy controls

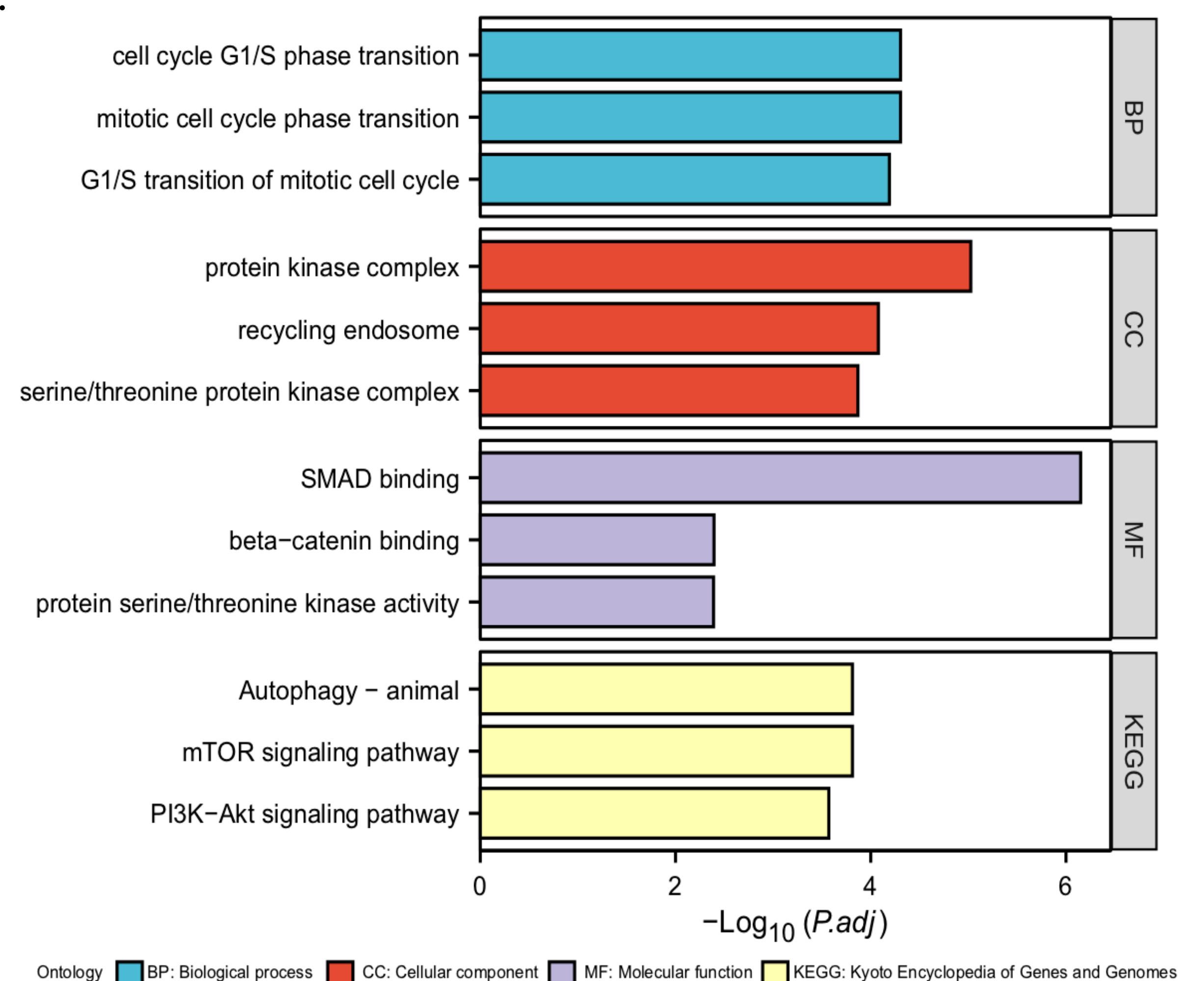
Up-regulated	Down-regulated	
miR-518e-3p	miR-26b-5p	miR-20b-5p
miR-421	miR-19a-3p	miR-24-3p
miR-520h	miR-25-3p	miR-126-3p
miR-330-3p	miR-195-5p	miR-223-3p
miR-105-5p	miR-451a	miR-17-5p
miR-542-5p	miR-16-5p	miR-19b-3p
	miR-106a-5p	miR-18a-5p
	miR-140-3p	miR-23a-3p

- The literature research revealed that miR-16-5p is a well-studied miRNA in endocrine, neural, and stress homeostasis^{3,4}.

- Target gene prediction of miR-16-5p (overlap of TargetScan, miRDB and miRTarBase)



- Biological function analysis of miR-16-5p (clusterProfiler [4.4.4] in R).



Conclusion

- The results showed that ELS leads to persistent changes in plasma EV cargo, with more than 20 miRNAs differentially regulated even decades later.
- EV miR-16-5p modulates key pathways (mammalian target of rapamycin (mTOR) signaling pathway and phosphatidylinositol-4,5-bisphosphate 3-kinase (PI3K)/protein kinase B (Akt) signaling pathway) involved in the stress homeostasis, neuroplasticity, and neurodevelopment, acting as a molecular mediator that translate early environmental challenges into long-term biological and behavioral outcomes.
- We plan further functional validation experiments to prove these predictions.

REFERENCES

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2. Zaborowski, M.P., et al., *Extracellular Vesicles: Composition, Biological Relevance, and Methods of Study*. Bioscience, 2015. 65(8): p. 783-797.
3. Tavares G A, Torres A, De Souza J A. Early life stress and the onset of obesity: Proof of microRNAs' involvement through modulation of serotonin and dopamine systems' homeostasis[J]. Frontiers in physiology, 2020, 11: 925.
4. Kim Y J, Kim S H, Park Y, et al. miR-16-5p is upregulated by amyloid β deposition in Alzheimer's disease models and induces neuronal cell apoptosis through direct targeting and suppression of BCL-2[J]. Experimental Gerontology, 2020, 136: 110954.

