

Deciphering extracellular vesicles as a mode of communication between an intracellular malaria parasite and human host



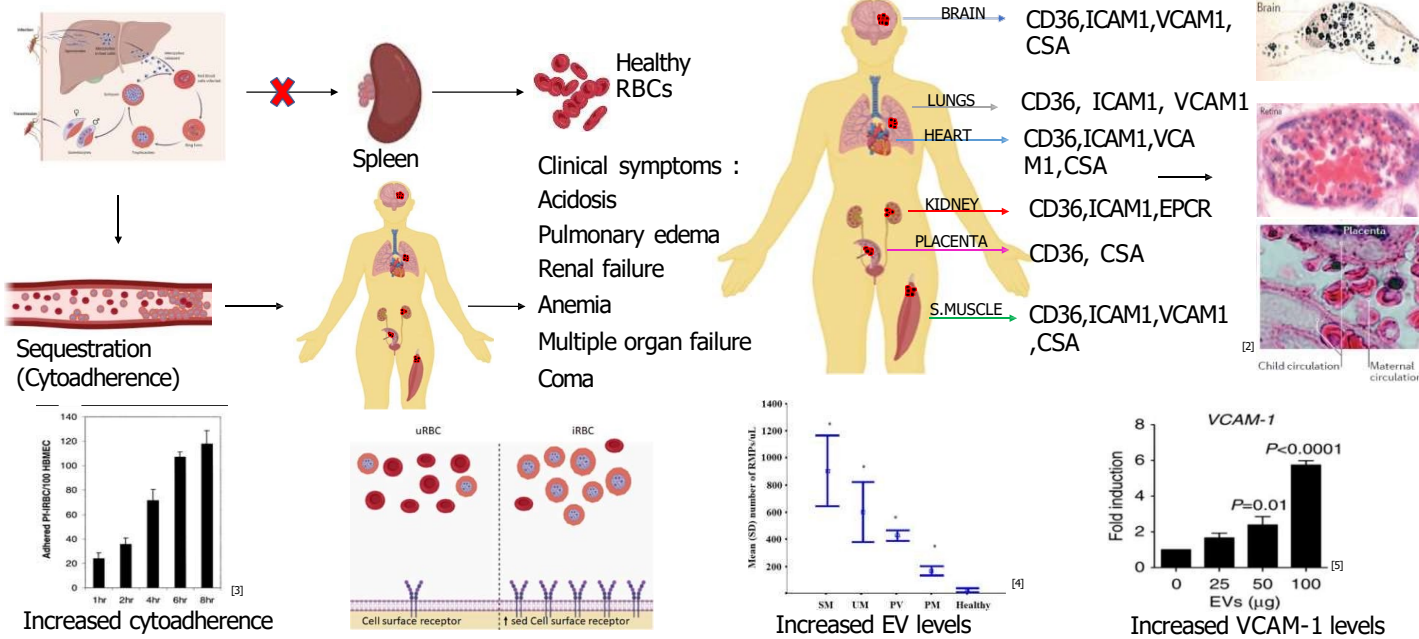
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Abstract:

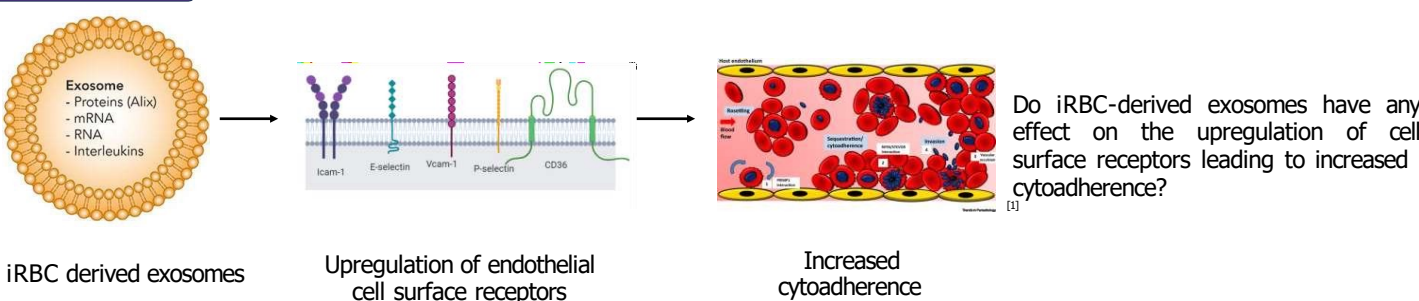
Severe malaria, caused by *Plasmodium falciparum*, involves the adherence of the parasite to host endothelial cells through specific receptors. We show that extracellular vesicles (EVs) released by *P. falciparum* strains FCR3 and 3D7 play a critical role in modulating these host-parasite interactions. Parasite-derived EVs influence host receptor expression, enhancing the cytoadherence of infected red blood cells (iRBCs) to endothelial surfaces. Exposure to these EVs activates the ERK pathway via c-Jun, upregulating receptors that promote cytoadherence. Our findings highlight EV-mediated modulation of parasite-host communication and propose EV molecules as promising biomarkers and therapeutic targets for malaria.

Introduction:

- Malaria is a febrile disease caused by a blood parasite called *Plasmodium* transmitted by the bite of an infected female *Anopheles* mosquito.
- Plasmodium falciparum* is known to be the most dangerous strain of all.
- Plasmodium falciparum* shows a very interesting phenomenon known as sequestration, wherein infected RBCs bind onto the surface of endothelial cells in the microvasculature.

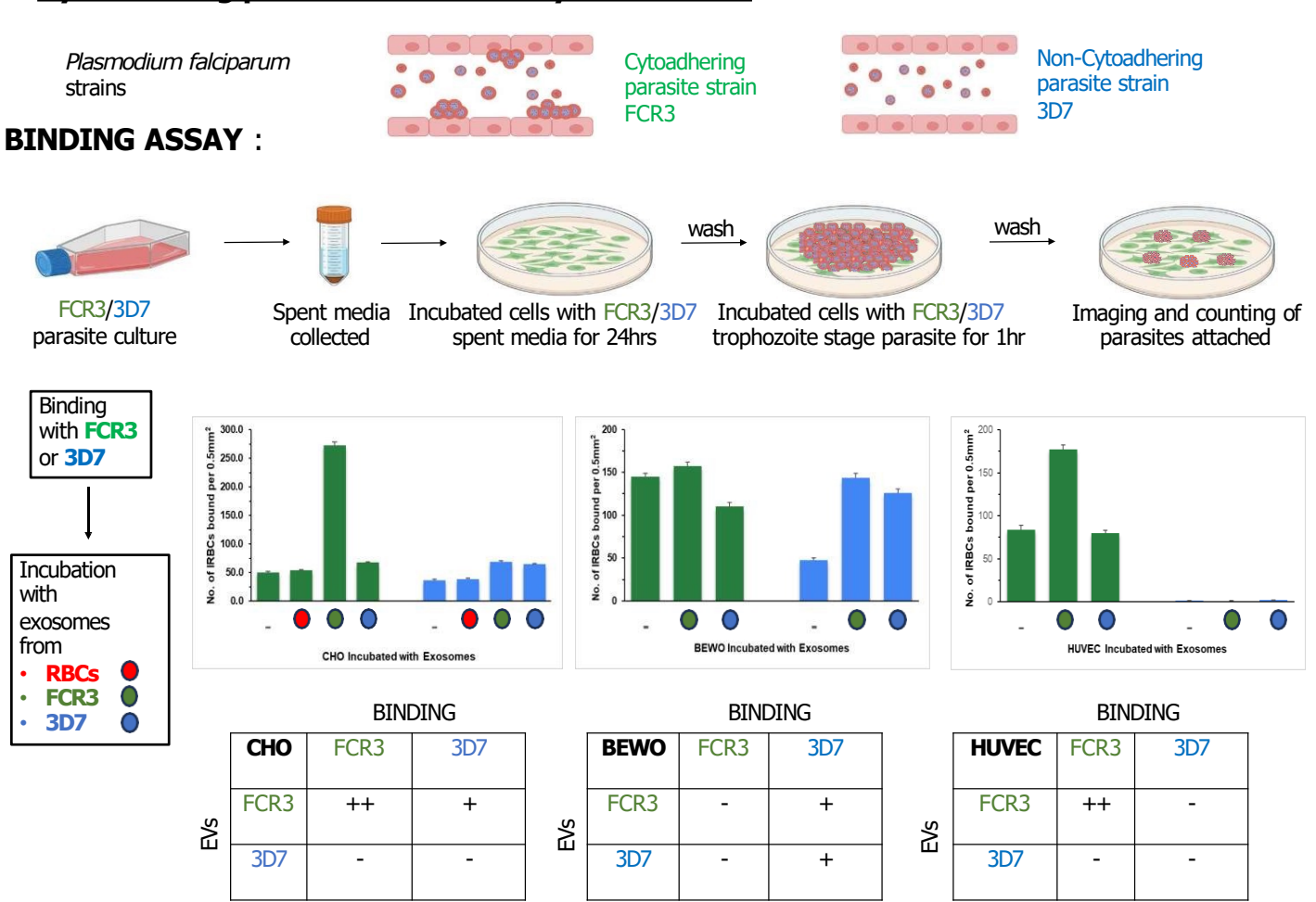


Hypothesis:

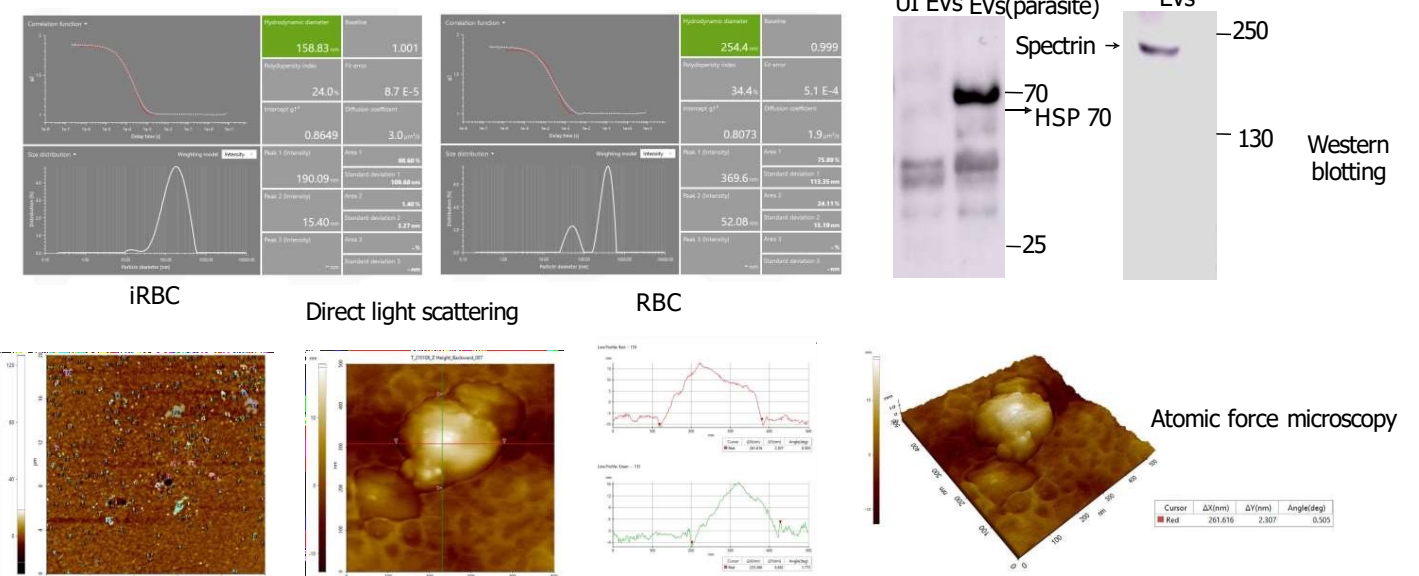


RESULTS:

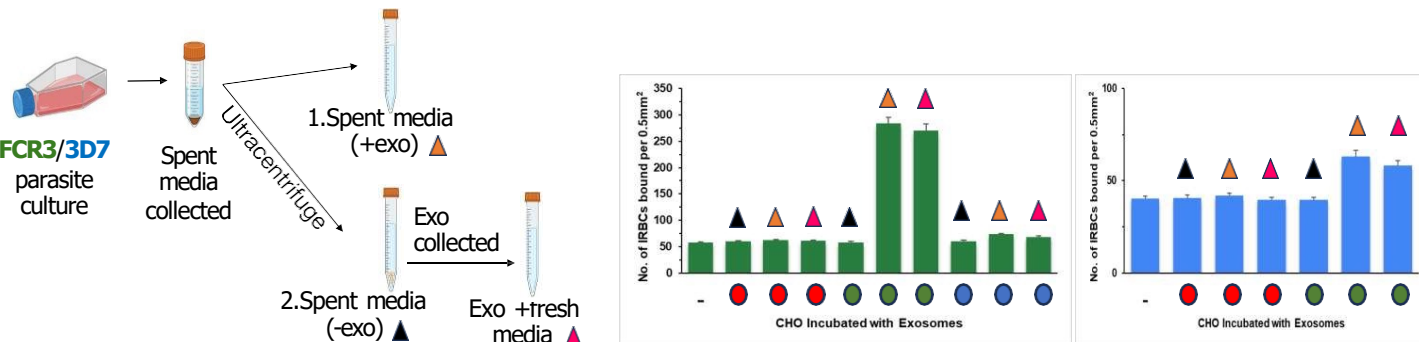
1. Cytoadhering parasites facilitates cytoadherence



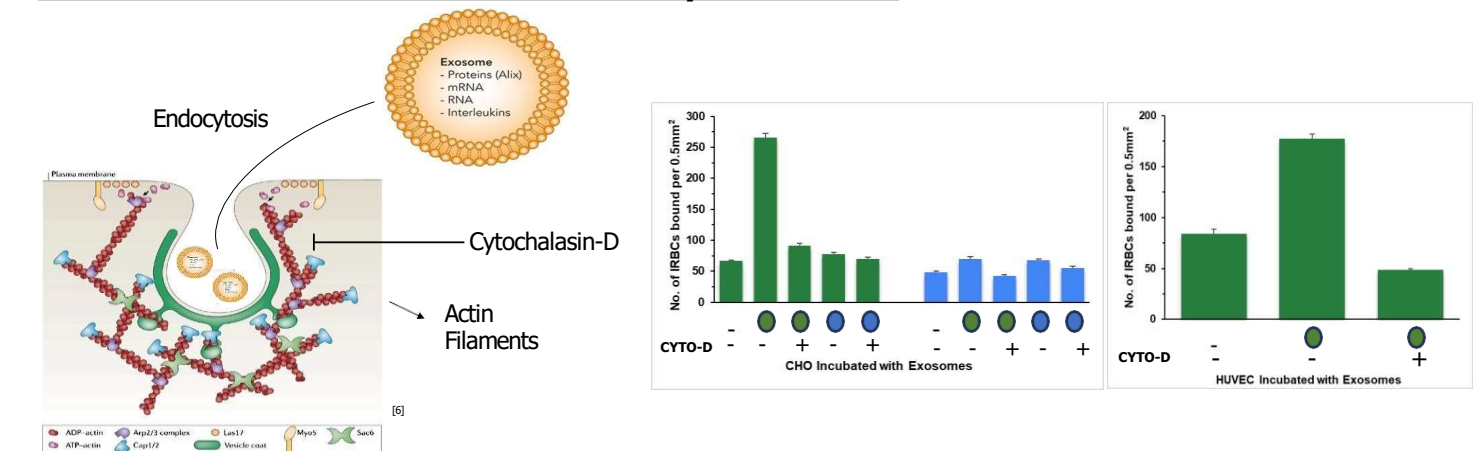
2. Isolation and characterization of exosomes



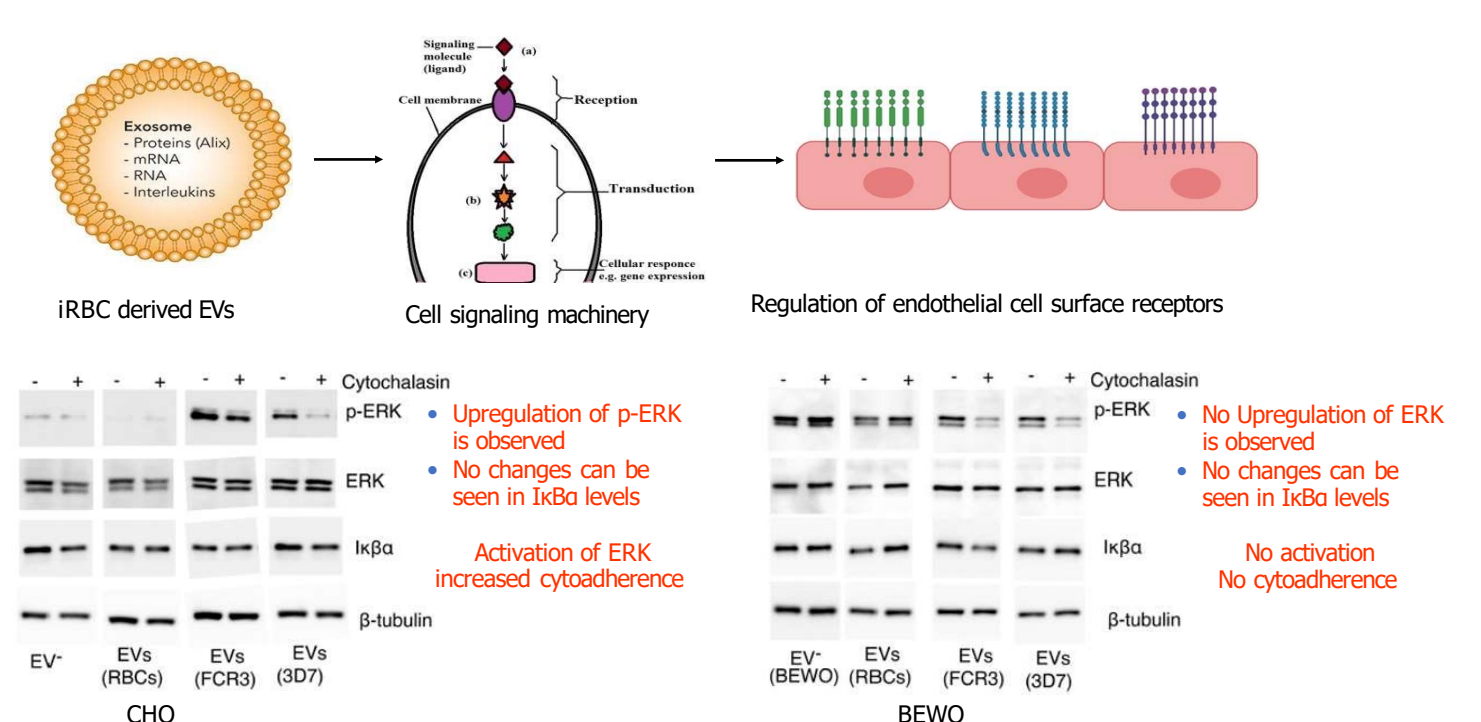
3. Extracellular vesicles help increase cytoadherence



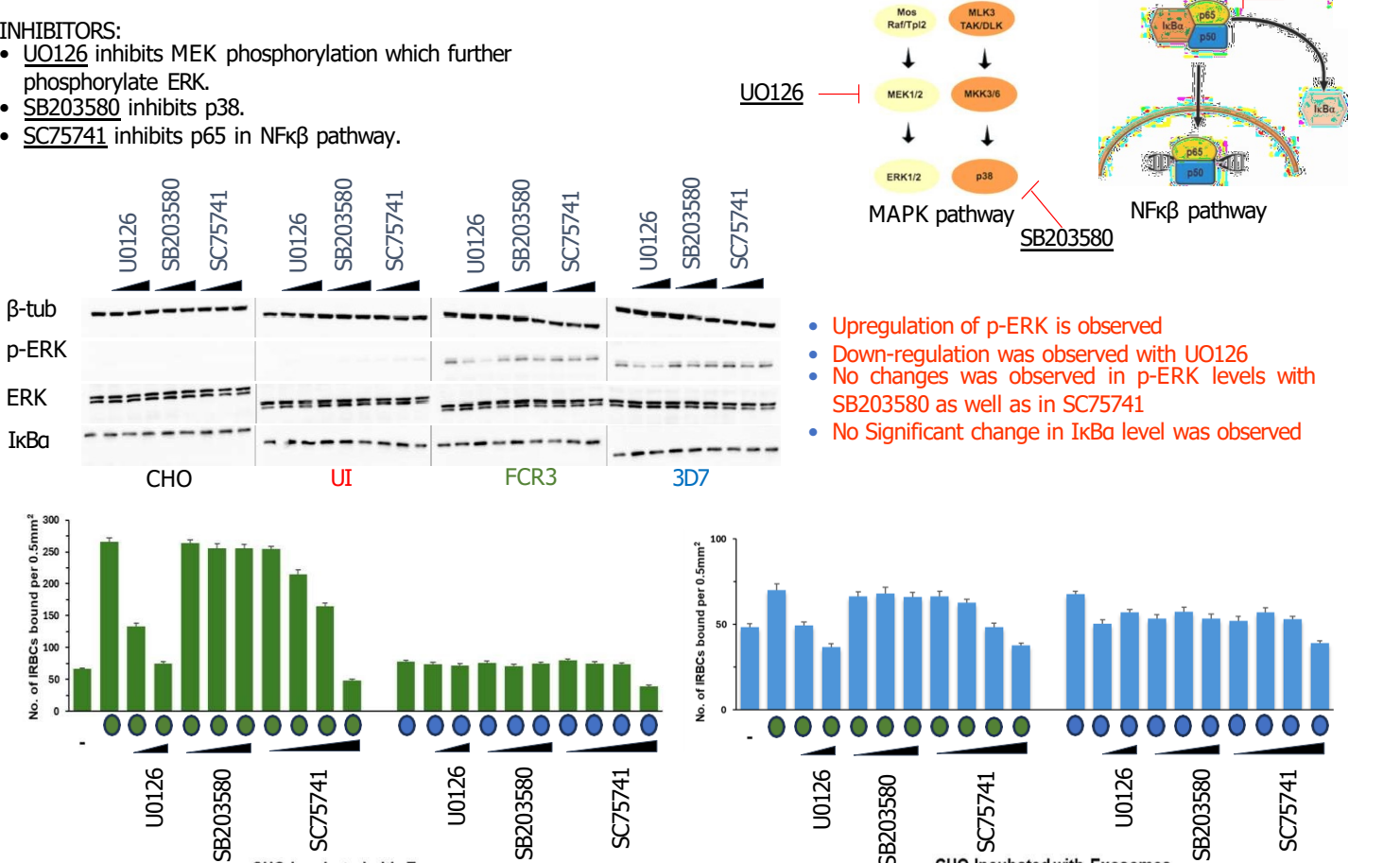
4. Characterization of role of exosomes in cytoadherence



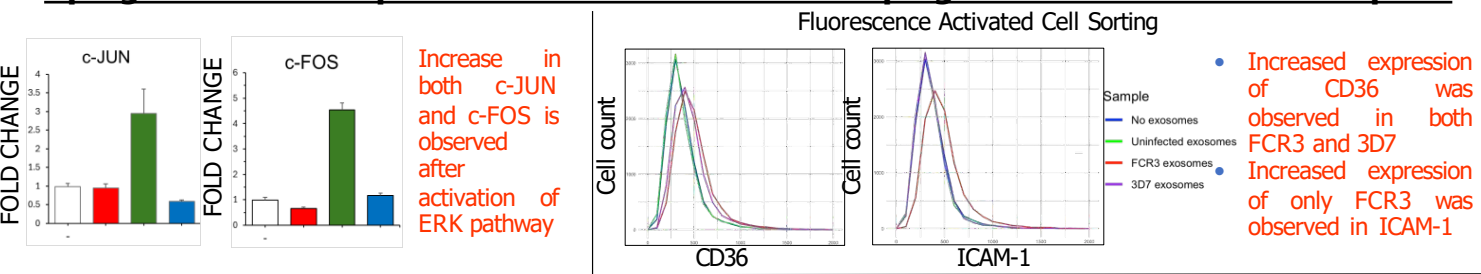
5. Cell surface changes: A Glimpse into Host Signaling Machinery



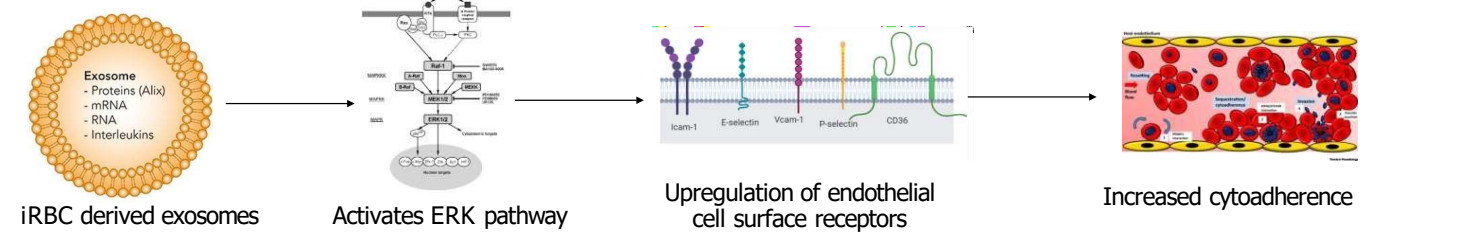
6. Unravelling the pathway on how the signal unfolds downstream



7. Upregulated Transcription factors downstream and Upregulation of cell surface receptors



CONCLUSION:



DISCUSSION:

The observed upregulation of cell surface receptors in human host cells upon exposure to exosomes suggests that bioactive components within the exosomes are mediating these cellular changes. This points toward a functional role of exosome cargo in modulating host cell behaviour, potentially facilitating parasite-host interactions. Identifying the specific molecular constituents—such as proteins, RNAs, or lipids—responsible for this modulation will provide deeper insight into the mechanisms employed by the parasite to influence host cell pathways. Furthermore, elucidating these interactions will enhance our understanding of the functional diversity among clinical isolates, offering valuable perspectives for developing targeted therapeutic or diagnostic strategies.

Reference:

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