Insights into improving male reproductive performance by integrating seminal plasma extracellular vesicle–based interventions within a One Health framework

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Introduction

Seminal plasma (SP) extracellular vesicles (EVs) play a conserved role in reproductive physiology by modulating sperm function. Understanding and harnessing these vesicle-mediated interactions offers new opportunities to develop regenerative and precision fertility strategies that bridge animal and human reproductive medicine.

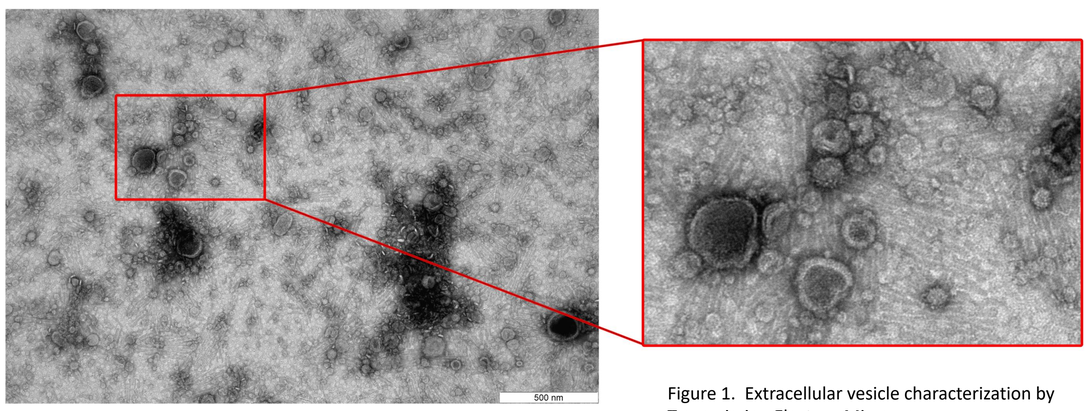


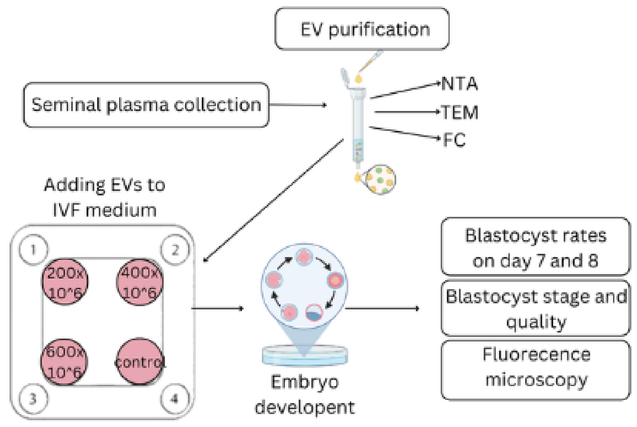
Figure 1. Extracellular vesicle characterization by Transmission Electron Microscopy.

Experimental design

1. EVs from HF bull SP were added to 100 µL IVF medium in three concentrations (A:200 $\times 10^6$, B:400 $\times 10^6$, C:600 $\times 10^6$ EVs $mL^{-1}$and D: control).

2. EVs from LF bull SP were added to the IVF medium in a final concentration of 600 $\times 10^6$ EVs mL^{-1}.

Figure 2. Experimental design.



Results

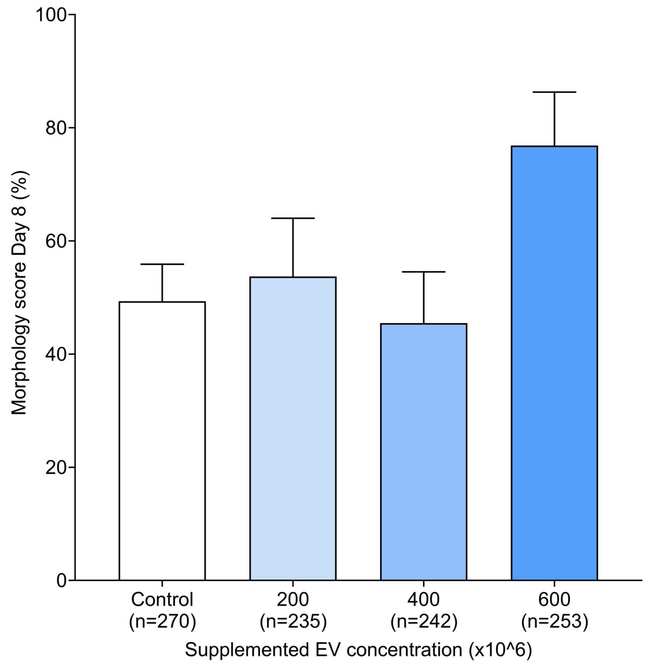


Figure 3. Day 8 blastocyst morphological score (%) after IVF supplementation with HF bull seminal plasma EVs with four different concentrations. The highest morphological score was presented in group 600 $\times 10^6$ EVs mL^{-1}.

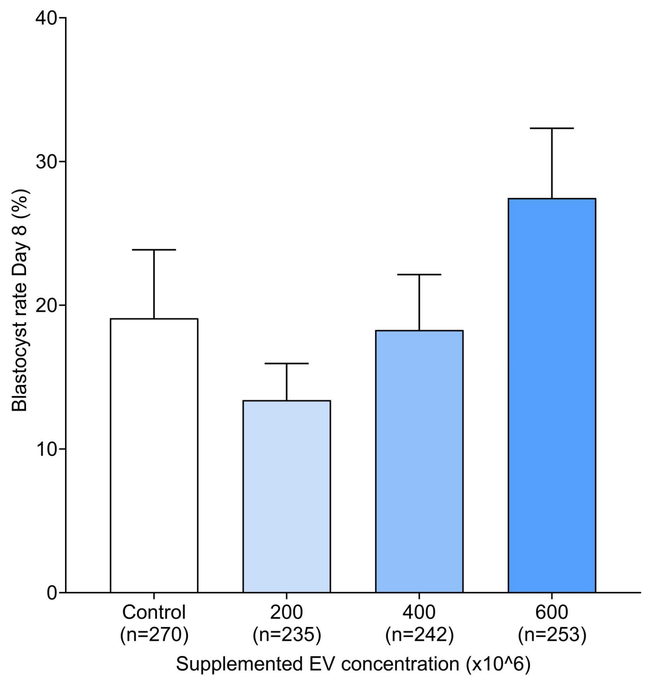


Figure 4. Day 8 blastocyst rate (%) after IVF supplementation with HF bull seminal plasma EVs with four different concentrations. The highest blastocyst score was presented in group 600 $\times 10^6$ EVs mL^{-1}.

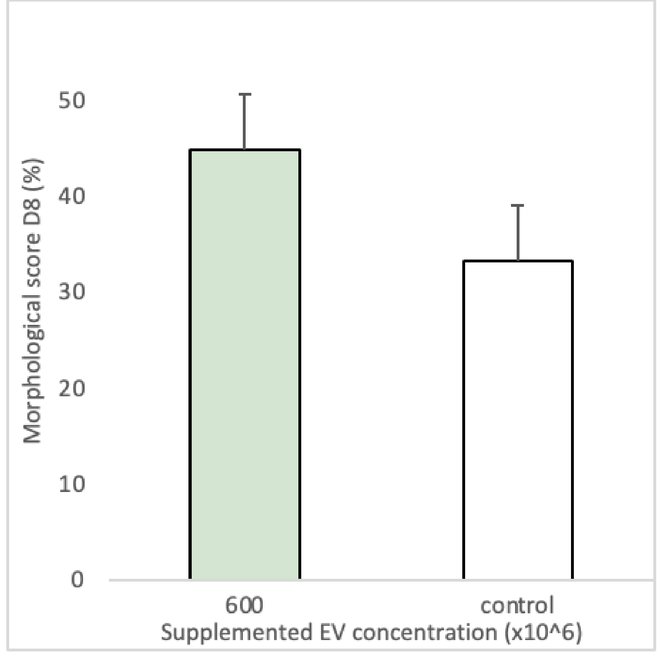


Figure 5. Day 8 blastocyst morphological score (%) after IVF supplementation with LF bull seminal plasma EVs with concentration of 600 $\times 10^6$ EVs mL^{-1}.

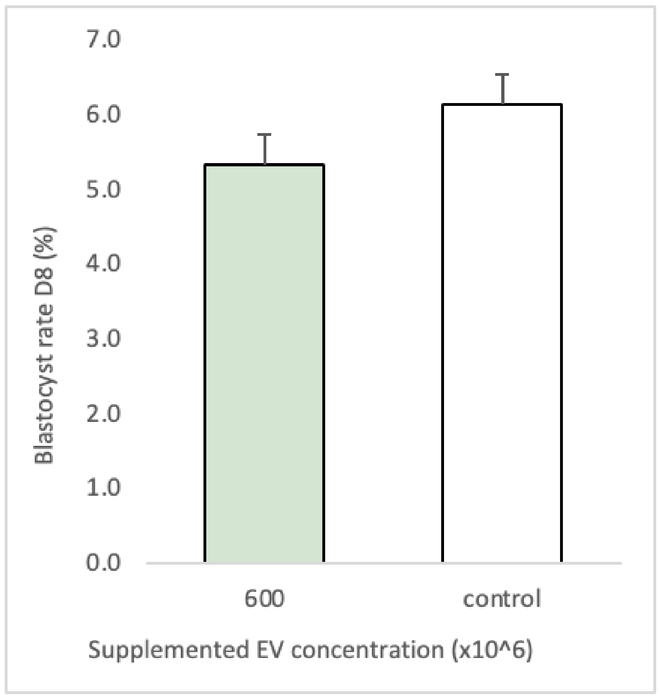


Figure 6. Day 8 blastocyst rate (%) after IVF supplementation with LF bull seminal plasma EVs with with concentration of 600 $\times 10^6$ EVs mL^{-1}.

Conclusions

The preliminary results suggest improvement in embryo morphology and blastocyst rates when adding 600×10^6 EVs mL^{-1} SP EVs from known HF bulls to the IVF media of known LF bulls. On the other hand, no differences were observed when adding 600×10^6 EVs mL^{-1} SP EVs from known LF bulls to the IVF media. More research is needed on the cargo components of SP EVs to understand the translational mechanisms underlying EV-mediated reproductive modulation across species.

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