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PhD in Veterinary Science

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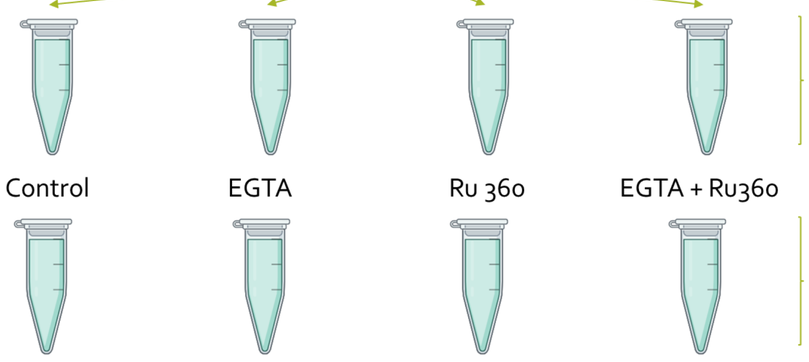
Mitochondrial calcium intake through Mitochondrial Calcium Uniporter is essential to modulate tail protein phosphorylation during boar sperm “in vitro” capacitation

Introduction

Mitochondrial Calcium uniporter (MCU) is a calcium channel present in the in the inner mitochondrial membrane that permits the transit of calcium into the mitochondria. The aim of the research was to understand the role that the MCU plays in sperm capacitation

Materials & Methods

7 different ejaculates



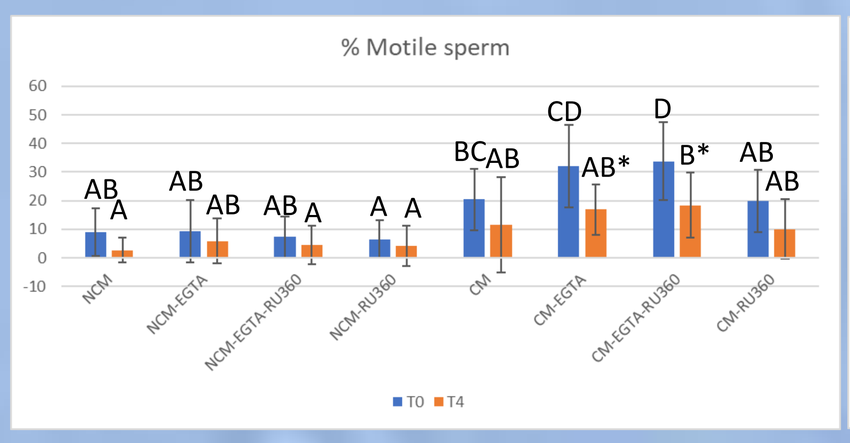
Total and Progressive motility

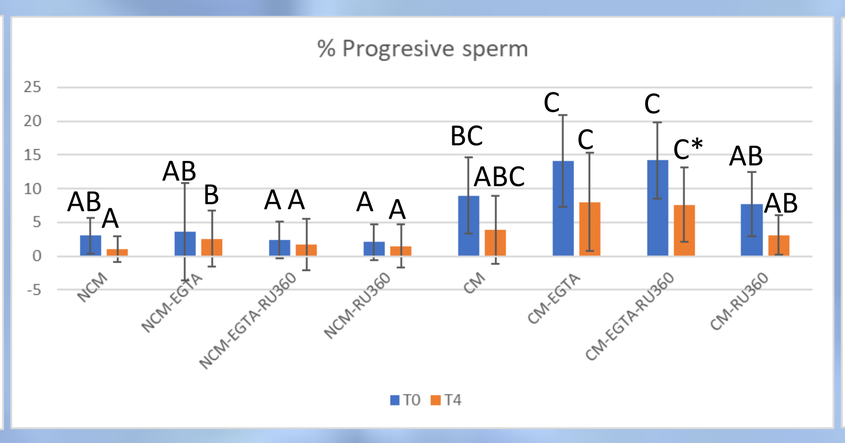
Fosforilazione delle tirosine delle proteine

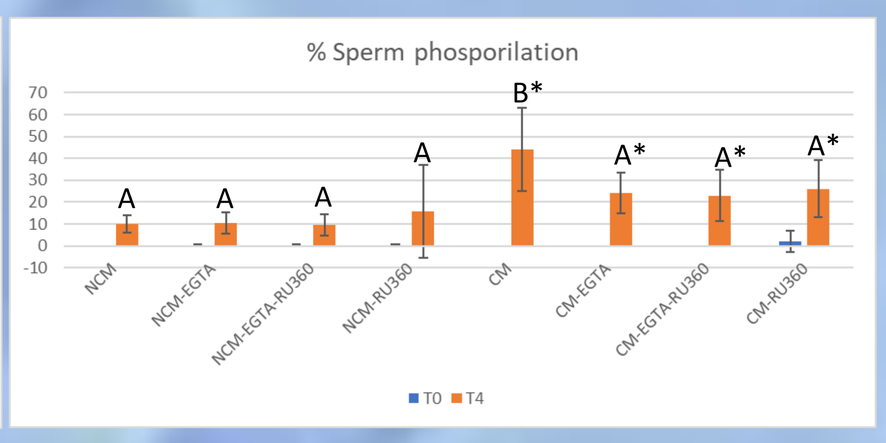
Two different conditions: Non-Capacitating Medium (NCM) and Capacitating Medium (CM). 4 subgroups: Control media (CM and NCM); EGTA medium without Calcium and with 5µM EGTA; RU360 medium with 5µM RU360; EGTA+RU360 medium EGTA medium with 5µM RU360.

Total and Progressive motility were evaluated by CASA system; sperm capacitation was assessed by protein tyrosine phosphorylation immunolocalization at 0h and 4h of incubation 39°C.

Results







Barplots representing the percentage of Motile, Progressively motile and capacitated spermatozoa at time 0h (blue) and 4h (orange) of incubation in different media. Data are presented as mean ± SD (error bars). Different superscripts letters indicate differences between treatments at same time, * indicates differences within treatment at each time point.

Discussion

In CM-EGTA and CM-EGTA-RU360 subgroups an increase in the total and progressive motility at 0h and at 4h was observed. This might not be related with MCU because in the CM+RU360 treatment this effect was not present. When evaluating the percentage of sperm with tyrosine phosphorylation, we detected a significant increase after 4h respect 0h in all CM irrespective of the presence of the inhibitor.

Conclusions

Calcium ions and MCU seem to be primarily involved in boar sperm during in vitro capacitation process as, in absence of Ca ions or inhibiting their transporter capacitation does not occur

Future Proposal

Study the other mitochondrial calcium channels (VDSC2, $Na^{+}/Ca^{2+}/Li+$ exchanger and Ca^{2+}/H^{+} exchanger) during the capacitation to assess their role in this process