EVALUATING ANTIOXIDANT SUPPLEMENTATION DURING IN VITRO MATURATION OF OOCYTES FROM PCOS PATIENTS WITH MINIMAL FSH PRIMING

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Introduction

In vitro maturation (IVM) is an assisted reproductive technology in which immature oocytes are retrieved from small antral follicles after minimal or no stimulation and matured in vitro. Although widely used in animal models, its application in humans remains limited due to lower efficiency and embryo yield compared to conventional IVF. For patients with polycystic ovary syndrome (PCOS), who often have high antral follicle counts (AFC) and increased oxidative stress, IVM offers advantages by eliminating the risk of ovarian hyperstimulation syndrome (OHSS) and potentially improving oocyte quality in vitro.

Objective

To refine a biphasic IVM system by evaluating the effects of the mitochondrial-targeted antioxidant, mitoquinol (MQ), in mitigating oxidative stress during IVM, thereby improving outcomes and offering a safer, less expensive, and less burdensome alternative to conventional IVF for patients with PCOS.

Materials & Methods

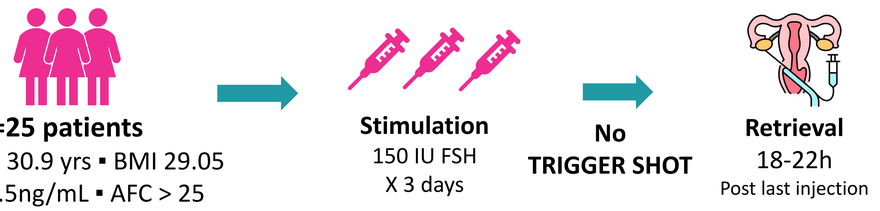


Fig 1. Patient demographics and treatment protocol.

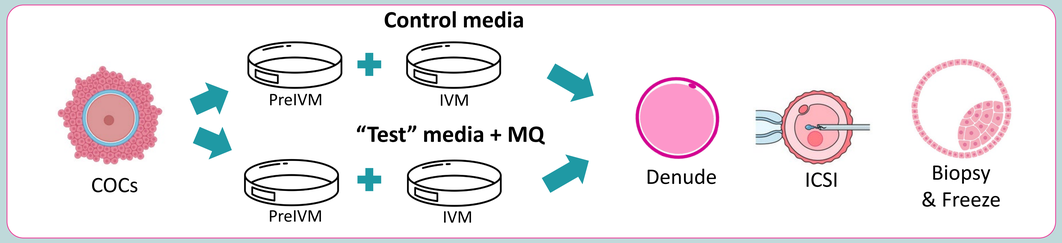


Fig 2. Laboratory protocol.

Results

	Control	+MQ
% MII	57.6	59.2
% Fert	80.8	80.6
% Cleav	96.4	93.2
% Blast	32.7	33.5

Fig 3. A total of 715 immature oocytes were retrieved. There was no significant difference between oocytes incubated in IVM medium without MQ (CON) or with MQ (+MQ).

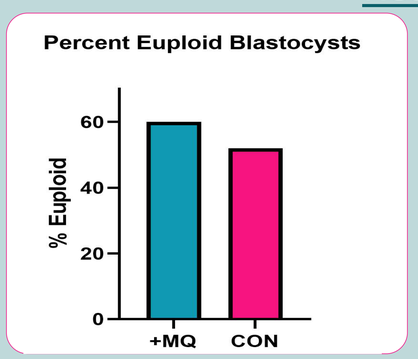


Fig 4. An increase in the number of euploid embryos from COCs cultured with MQ was observed.

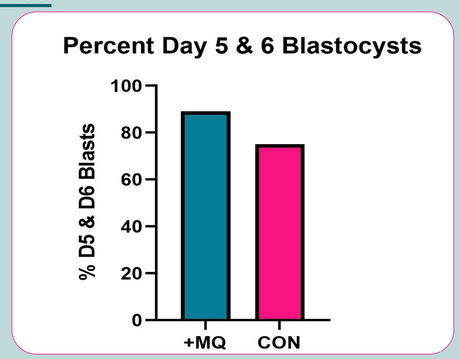


Fig 5. COCs cultured with MQ produced more day 5-6 blastocysts.

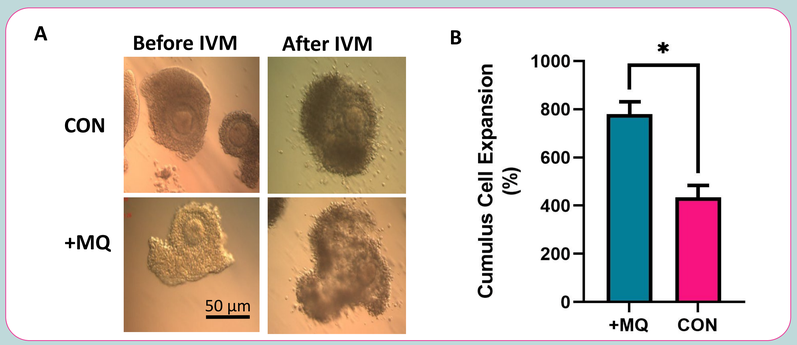
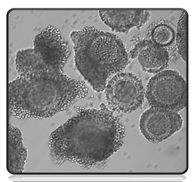


Fig 6. The effects of MQ in IVM media on COC expansion. (A) Representative images of cumulus expansion in COCs. (B) Significantly increased COC expansion were observed in MQ treated group. * P < 0.05.



25 Retrievals
- Avg. 30 COCs/patient
- 58% Maturation rate

92% (n=23)
Patients with Blasts
- Avg 32.8% Blast/Cleaved
- 4.24 blasts per retrieval

88% (n=22)
Patients w/ Blasts to transfer
56% Euploid rate

Fig 7. Compiled results from both groups with representative images of patient COCs, blastocysts, and blastocyst being biopsied.

Conclusions

MQ did not significantly improve oocyte maturation or fertilization rates; however, despite the limited sample size, it modestly improved blastocyst quality and increased euploid rates, suggesting a potential benefit from reducing oxidative stress during oocyte maturation. To date there are 6 live births from this study with one additional ongoing pregnancy and additional frozen embryo transfers pending. Continued optimization of IVM protocols may help close the efficiency gap between IVM and conventional IVF, providing patients with PCOS a lower-cost, lower-risk, and less burdensome treatment option.