

# Association between cytoplasmic granularity of oocytes and age in patients undergoing elective oocyte cryopreservation

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## INTRODUCTION

Centrally localized cytoplasmic granularity (CLCG) is an intracytoplasmic abnormality characterized by a dark, spongy-like granular appearance in the center of the oocyte<sup>1,2</sup>. While several studies have investigated the association of CLCG with the quality of oocytes retrieved from patients during infertility treatments, elective oocyte cryopreservation (EOC) cycles provide a unique opportunity to understand the frequency and impact of CLCG in a different population.



Figure 1: Metaphase II (MII) human oocyte exhibiting centrally localized cytoplasmic granulation (CLCG), as well as a large perivitelline space (Atlas of human embryology, 2012)<sup>2</sup>.

## OBJECTIVE

The purpose of this study was to assess the CLCG rates in a cohort of patients undergoing EOC treatments and the association between CLCG and patient age.

## METHODS

We assessed the CLCG of 5,318 metaphase II (MII) oocytes obtained from 422 EOC cycles from 05/20/2017 to 04/01/2018 with a minimum of 5 MII oocytes per cycle. Cycles were classified according to the percentage of MII oocytes with CLCG in the cohort of each retrieval: no CLCG (0%), low CLCG (1-25%), intermediate CLCG (26-50%), high CLCG (51-75%) and severe CLCG (76-100%). Patients were grouped into four age categories: <35, 35-36, 37-38, and >38 years. Frequencies of CLCG grades in each age group were compared using Monte Carlo resampling and CLCG percentage comparisons were assessed using Kruskal-Wallis H test. P<0.05 was considered statistically significant.

## RESULTS

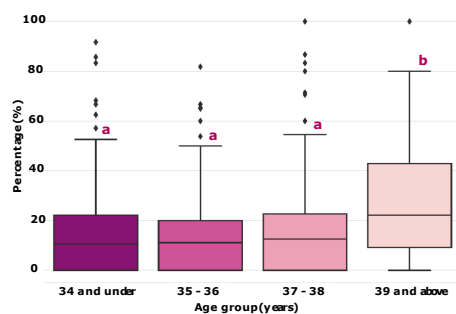


Figure 2: Median percentage of MII oocytes in an EOC cycle that exhibited CLCG organized by age group. (<35 years: 10.5% [IQR: 0 - 22.6%]; 35-36 years: 11.1% [IQR: 0 - 20.0%]; 37-38 years: 12.5% [IQR: 0 - 22.6%]; >38 years: 22.2% [IQR: 9.2-42.9%], p<0.05)

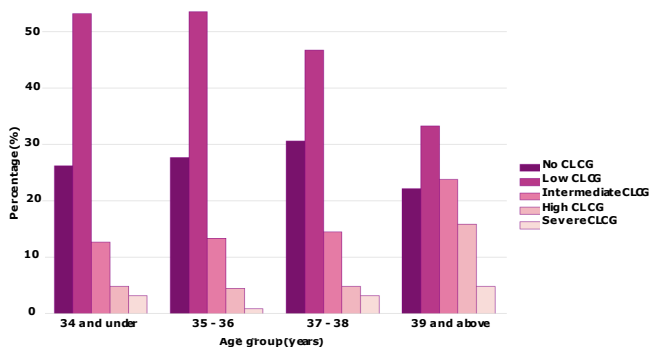


Figure 3: Percentage of cycles that exhibit no, low, intermediate, high, or severe EOC cases of MII oocytes with CLCG per age group.

Table 1: Percentage of MII oocytes that exhibit CLCG per EOC cycle organized by age group. Groups of patients 38 years old and younger showed a higher percentage of cycles graded as no or low CLCG (26.2 - 30.6 % and 46.8 - 53.6 %, respectively) in comparison to patients > 38 years old (22.2% and 33.3 %), respectively; p<0.05 for frequency comparisons.

|               | No CLCG | Low CLCG | Intermediate CLCG | High CLCG | Severe CLCG |
|---------------|---------|----------|-------------------|-----------|-------------|
| < 35 years    | 26.2    | 53.2     | 12.7              | 4.8       | 3.2         |
| 35 - 36 years | 27.7    | 53.6     | 13.4              | 4.5       | 0.9         |
| 37 - 38 years | 30.6    | 46.8     | 14.5              | 4.8       | 3.2         |
| > 38 years    | 22.2    | 33.3     | 23.8              | 15.9      | 4.8         |

Approximately 76% of cycles presented no to low CLCG.

The median percentage of MII oocytes with CLCG was higher in cycles of patients 39 years and above, compared to other groups.

Groups of patients 38 years and younger exhibited a higher percentage of cycles graded as no to low CLCG.

## CONCLUSIONS

Our results indicate that there is a significant difference in the percentage of MII oocytes that exhibit CLCG per cycle between women >38 years of age undergoing EOC and the other age groups. Furthermore, these data reveal that around three out of four cycles of women undergoing EOC will exhibit no to low percentage of MII oocytes with CLCG. Further studies are necessary to determine the influence of CLCG grades on vitrification and IVF outcomes in this population.

## References

<sup>1</sup>Kahraman S, Yakin K, Donmez E, et al. *Relationship between granular cytoplasm of oocytes and pregnancy outcome following intracytoplasmic sperm injection*. Hum Reprod. 2000; 15(11):2390-2393

<sup>2</sup>Magill MC, Jones GM, Lundin K, Van den Abbed E. *Atlas of human embryology; from oocytes to preimplantation embryos*. Hum Reprod. 2012; 27:1. Available at <http://atlas.eshie.eu>

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