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age groups. TL was similar in young groups while in older groups TL was statistically significantly different (134.6 ± 15.95 a.u vs 113.6 ± 12.99 a.u, NZ and OAZ respectively, p = 0.035). Moreover, an accumulation of critically short telomeres was found in older OAZ (3.28 % vs 11.68 %, NZ and OAZ respectively; p = 0.043). To analyse telomere protection, TRFL levels were studied. In blood, younger OAZ showed lower levels of TRFL (317.3 ± 49.93 a.u vs 267.7 ± 40.02 a.u, NZ and OAZ respectively; p = 0.010) and accumulated a higher percent of low TRFL levels at telomeres (16.9% vs 25.22 %, p = 0.001). Regarding ART outcomes, a lower rate of fertilization per Metaphase II oocytes (0.358 ± 0.072 vs 0.811 ± 0.019, p < 0.0001) and a higher rate of abortion (0.277 ± 0.188 vs 0.014 ± 0.014, p = 0.032) was found in older OAZ after intracytoplasmic sperm injection using donor oocytes and transfer.

CONCLUSIONS: OAZ patients have a shorter systemic TL already detectable at young age and also patent in sperm at older ages, possibly due to telomere unprotection with low levels of TRFL. Therefore, in OAZ patients, alteration of telomere biology could cause the premature aging of the reproductive system. Additionally, older OAZ had worse ART outcomes in contrast with NZ, suggesting that correct TL maintenance is a potential molecular marker of sperm quality to consider at older ages, before performing ART.

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TABLE 1. Predictive value, likelihood ratio, sensitivity, and specificity for diagnosis of embryo aneuploidy

| Pretest prevalence | PPV | NPV | LR+ | LR- | Sensitivity (%) | Specificity (%) |
|--------------------|-----|-----|-----|-----|----------------|----------------|
| **Two factors**    |     |     |     |     |                |                |
| Maternal age > 38 years + ICM type C | 52.6 | 81.8 | 49.6 | 4.0 | 0.9 | 12.0 | 97.0 |
| Maternal age > 38 years + TE type C | 52.6 | 88.6 | 51.2 | 7.0 | 0.8 | 17.4 | 97.5 |
| **Three factors**  |     |     |     |     |                |                |
| Maternal age > 38 years + TE type C | 52.6 | 85.0 | 48.8 | 5.1 | 0.9 | 7.6 | 98.6 |

PPV: Positive predictive value; NPV: Negative predictive value; LR: Likelihood ratio; ICM: Inner cell mass; TE: Trophoectoderm.