

Supplemental Table S1. Patients' characteristics

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|--|--------------------------|
| | |
| Maternal age, mean \pm SD | 38.9 \pm 3.3 years old |
| BMI, mean \pm SD | 21.8 \pm 3.6 |
| Previous conception(s), N, % | |
| No | N=527/786, 67.0% |
| Yes | N=259/786, 33.0% |
| Duration of infertility, mean \pm SD | 3.4 \pm 2.2 years |
| Main cause of infertility, N, % | |
| Idiopathic | N=524/786, 66.7% |
| Endocrine-ovulatory | N=20/786, 2.5% |
| Tubal | N=72/786, 9.2% |
| Endometriosis | N=56/786, 7.1% |
| Male factor | N=114/786, 14.5% |
| Sperm quality | |
| No defects | N=417/786, 53% |
| 1-2 defects | N=238/786, 30% |
| 3 defects | N=113/786, 14.3% |
| Obstructive azoospermia | N=10/786, 1.2% |
| Non-obstructive azoospermia | N=8/786, 1% |

Supplemental Table S2. Distribution of the PGT-A cycles in the clinical simulation for the comparison of embryologists' (E) versus zp-T qSEA's performance in ranking euploid blastocysts on top. The results are summarized in Supplementary Figure S3.

* ≥ 2 embryos ranked on top according to the embryologists, that included also the embryo ranked on top according to the zp-T qSEA

^ ≥ 2 embryos ranked on top according to the embryologists, of which ≥ 1 euploid and ≥ 1 aneuploid

| Ranking | E vs zp-T qSEA Concordant | | E vs zp-T qSEA Discordant | | | | | | E vs zp-T qSEA Not Assessable* | | | |
|---------------------|---------------------------|------------|---------------------------|------------|---------|-----------------|---------------------------------------|---------------------------------------|--------------------------------|------------|---------------------------------------|---------------------------------------|
| Euploidy prediction | Both wrong | Both right | Both wrong | Both right | E right | zp-T qSEA right | E not assessable^ but zp-T qSEA right | E not assessable^ but zp-T qSEA wrong | Both wrong | Both right | E not assessable^ but zp-T qSEA right | E not assessable^ but zp-T qSEA wrong |
| | 25 | 60 | 12 | 23 | 52 | 26 | 13 | 21 | 10 | 21 | 53 | 36 |

Supplemental Table S3. Distribution of the PGT-A cycles in the clinical simulation for the comparison of embryologists' (E) versus zp-A qSEA's performance in ranking euploid blastocysts that resulted in a live birth (LB) on top. The results are summarized in Supplementary Figure S4A.

| Ranking (among euploid blastocysts) | E vs zp-A qSEA Concordant | | E vs zp-A qSEA Discordant | | | | |
|--|--|---------------|------------------------------|---------------|------------|--------------------|----------------------------------|
| LB prediction (among euploid blastocysts) | Both wrong | Both right | Both wrong | Both right | E right | zp-A qSEA right | zp-A qSEA not transferred yet |
| | N=53 PGT-A cycles with ≥ 2 ETs, of which ≥ 1 LB and ≥ 1 failure | | | | | | |
| | 15 | 7 | 2 | 1 | 5 | 18 | 5 |
| | N=99 PGT-A cycles with only 1 ET performed up to date | | | | | | |
| | 16 | 46 | - | - | - | - | 37 |
| | N=14 PGT-A cycles with all transfers resulting in a LB | | | | | | |
| | - | 5 | - | 5 | - | - | 4 |
| | N=50 PGT-A cycles with all transfers resulting in a failure | | | | | | |
| | 27 | - | 19 | - | - | - | 4 |

Supplemental Table S4. Distribution of the PGT-A cycles in the clinical simulation for the comparison of embryologists' (E) versus emb-A qSEA's performance in ranking euploid blastocysts that resulted in a live birth (LB) on top. The results are summarized in Supplementary Figure S4B.

| Ranking (among euploid blastocysts) | E vs embA qSEA Concordant | | E vs embA qSEA Discordant | | | | |
|--|--|---------------|------------------------------|---------------|------------|-----------------------|----------------------------------|
| LB prediction (among euploid blastocysts) | Both wrong | Both right | Both wrong | Both right | E right | embA qSEA right | embA qSEA not transferred yet |
| | N=53 PGT-A cycles with ≥ 2 ETs, of which ≥ 1 LB and ≥ 1 failure | | | | | | |
| | 15 | 7 | 2 | 1 | 5 | 18 | 5 |
| | N=99 PGT-A cycles with only 1 ET performed up to date | | | | | | |
| | 17 | 45 | - | - | - | - | 37 |
| | N=14 PGT-A cycles with all transfers resulting in a LB | | | | | | |
| | - | 5 | - | 5 | - | - | 4 |
| | N=50 PGT-A cycles with all transfers resulting in a failure | | | | | | |
| | 27 | - | 19 | - | - | - | 4 |

Supplemental Table S5. Distribution of the PGT-A cycles in the clinical simulation for the comparison of embryologists' (E) versus zp-T qSEA's performance in ranking euploid blastocysts that resulted in a live birth (LB) on top. The results are summarized in Supplementary Figure S4C.

| Ranking (among euploid blastocysts) | E vs zp-T qSEA Concordant | | E vs zp-T qSEA Discordant | | | | |
|--|--|------------|---------------------------|------------|---------|-----------------|-------------------------------|
| LB prediction (among euploid blastocysts) | Both wrong | Both right | Both wrong | Both right | E right | zp-T qSEA right | zp-T qSEA not transferred yet |
| | N=53 PGT-A cycles with ≥ 2 ETs, of which ≥ 1 LB and ≥ 1 failure | | | | | | |
| | 10 | 8 | 3 | 1 | 4 | 21 | 6 |
| | N=99 PGT-A cycles with only 1 ET performed up to date | | | | | | |
| | 14 | 21 | - | - | - | - | 64 |
| | N=14 PGT-A cycles with all transfers resulting in a LB | | | | | | |
| | - | 6 | - | 2 | - | - | 6 |
| | N=50 PGT-A cycles with all transfers resulting in a failure | | | | | | |
| | 27 | - | 21 | - | - | - | 2 |