

rule in these tests: the counting method and the single nucleotide polymorphisms (SNPs). This test is progressively become a first line choice during prenatal screening.

**Study design, size, duration:** This is a cohort study started on December 1<sup>st</sup> 2014 till November 30<sup>th</sup> 2015. Three thousand and seventy nine couples performed a SNPs based NIPT and we analysed results and follow up. The test include either a basic panel with detection of trisomy 13, 18, 21 and sexual chromosomes X and Y or an expanded panel (NIPT+) that includes 5 microdeletions as well. Patients decided after counselling to undergo one or the other.

**Participants/materials, setting, methods:** In our centers, we counsel pregnant patients for:

- non invasive tests such as combined test and NIPT;
- invasive tests such as chorionic villus sampling (CVS) and amniocentesis.

The NIPT is available after 9 + 0 weeks of gestation. The nurse withdraw two blood tubes from each woman and turn them upside down for 10 times. We keep the blood at room temperature. The cut off necessary to detect the fetal DNA signal is 4%.

**Main results and the role of chance:** Three thousand and seventy nine couples were tested, of that 1643 with the standard NIPT and 1436 used the panel with 5 microdeletion (NIPT+). The rate of no informative result due to low fetal fraction was 3.1% (51/1643) in the NIPT group and 4.2% (60/1436) in the NIPT+ arm. The number of high risk result was: 1.3% (20/1592) in NIPT and 2.3% (31/1376) in the NIPT+ group. Overall, we found 21 high risk for trisomy 21, 4 for trisomy 18, 6 for trisomy 13, 3 monosomy X, 1 triple X (XXX), 1 XXY, 4 XYY. As for the microdeletions we found 4 positive to Di George syndrome, 1 for p36, 3 positive for Angelman syndrome and 1 for cri du chat. When we obtain a positive result, the doctor always suggested an invasive follow up but a rate of patients did not accept it. Through CVS/amniocentesis 18 positive results were confirmed while 12 were false positive and not confirmed with invasive analyses. The remaining are either ongoing and did not accept invasive testing or lost of follow up. The microdeletion were confirmed in 1 case for a Di George syndrome. Up to this moment no false negative was detected.

**Limitations, reasons for caution:** The main limitation for this test is the cost. The Italian national health system pay only for combined test or, after 35 years old, for invasive tests. The NIPT does not show all the possible chromosomal abnormalities compatible with life. The NIPT+ evidenced a high rate of false positive results.

**Wider implications of the findings:** Pregnancies achieved through IVF treatments are often describes as “precious”. Our results show that in the population (IVF and spontaneous pregnancies) the majority of fetuses are healthy. In fact, only 0.6% (17/2968) tests were positive for aneuploidies and just one for a microdeletion syndrome (0.03%).

**Trial registration number:** N/A.

#### P-642 Combined time-lapse imaging and preimplantation genetic screening: a valuable strategy for embryo selection

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**Study question:** Is the time-lapse tool Eeva useful in a Preimplantation Genetic Screening (PGS) embryo-banking program to select among euploid embryos those with the highest implantation potential?

**Summary answer:** Eeva Test provides valuable information for embryo selection increasing the chances of pregnancy by accurately predicting the implantation potential of euploid embryos.

**What is known already:** Previous studies confirmed that genetic screening of human blastocysts significantly improves pregnancy rates per cycle diminishing the likelihood of miscarriage. Unfortunately, there is still a considerable number of euploid embryos that fail to implant. New embryo selection markers to improve ART-outcomes have been developed (mtDNA content, metabolomics or morphokinetic assessment). Time-lapse imaging (TLI) has emerged as an interesting non-invasive tool. No conclusive data about the utility of this technology for chromosome abnormalities determination is available; however, we wonder if combined TLI and PGS embryo selection may be a valuable strategy to identify those embryos with the best chances of success.

**Study design, size, duration:** This unicentric and retrospective study included 159 embryo-banking PGS-cycles from IVF and egg-donation patients seeking ART treatment at our centre between September 2013 and December 2015. The control group (*PGS-only*) comprised 70 cycles in which embryos had been selected for transfer following euploidy criteria only. The study group (*PGS + Eeva*) comprised 89 cycles in which embryo selection for transfer was based on combined PGS and Eeva predictions.

**Participants/materials, setting, methods:** All embryos were cultured, biopsied, and vitrified at the blastocyst stage. Genetic analyses of trophectoderm biopsies were performed by NGS. Single euploid blastocyst transfers were performed in all cases. Transfers were differed and under HRT. Within the control *PGS-only* group, the best morphological euploid embryo available was transferred. Within the *PGS + Eeva* group, the euploid blastocyst with the highest Eeva-prediction available was prioritized for transfer. Biochemical pregnancy rates of study groups were statistically compared.

**Main results and the role of chance:** Clinical characteristics were comparable between groups. There were no significant differences in terms of MII, fertilized eggs, blastocyst rate, high quality blastocyst rate and euploidy rate between the study groups. However, significant differences ( $p < 0.05$ ) were found when comparing pregnancy rates of the control *PGS-only* group [52.9% (37/70)] and the *PGS + Eeva* group cases where euploid embryos with *high* implantation potential as predicted by Eeva were transferred [73.4% (47/64)]. No such differences were found when pregnancy rates from transfers of euploid embryos classified as *medium* or *low* by Eeva were compared to controls. Similar results were obtained when IVF and egg donation cycles were independently analysed. A significantly higher pregnancy rate was achieved in transfers where *high* Eeva prediction in addition to PGS were used for embryo selection [(48% vs 69.2% in IVF cycles ( $p < 0.05$ )) and 54.1% vs 71.9% in egg-donation cycles ( $p < 0.05$ )]. These results show that Eeva Test provides valuable information for euploid embryo selection significantly increasing the chances of pregnancy in cycles where chromosomally normal embryos predicted by Eeva as *high* are prioritized for transfer.

**Limitations, reasons for caution:** The retrospective nature of this study may be a reason for caution. Data were collected from one laboratory using a specific culture system and protocols. Moreover, further data regarding clinical outcomes must be included to confirm the predictive value of the analyzed parameters.

**Wider implications of the findings:** To our knowledge, this is the largest dataset of single euploid embryo transfers selected by an automated time-lapse system. This analysis reveals the ability of early cleavage time-lapse parameters to predict embryo implantation potential and suggest that its combined use with genetic screening of embryos would significantly improve ART outcomes.

**Trial registration number:** A trial registration number was not required due to the retrospective study design.

#### P-643 A small trophectoderm biopsy sample is sufficient to detect most mosaicsms after analysis with high resolution next generation sequencing (NGS)

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**Study question:** Does a biopsy specimen of 4–6 contiguous cells taken from the trophectoderm provide a reliable representation of the remainder of a mosaic human embryo?

**Summary answer:** When mosaicism was identified in a small trophectoderm biopsy, mosaicism was determined to be present in other embryonic locations in 25/28 (89%) of the embryos.

**What is known already:** A high percentage of human blastocysts are mosaic. Unlike other methods, it is possible to identify mosaicism in trophectoderm biopsy specimens with high resolution NGS testing. Recent preliminary studies indicate that some mosaic embryos are capable of implantation and normal term development, albeit with a lower implantation rate and higher miscarriage rate than euploid embryos. Little is known of the fate of cell lineages in the human preimplantation embryo after post-meiotic chromosomal malsegregation.

**Study design, size, duration:** From October to December of 2015, 39 patients underwent aneuploidy screening with NGS, with vitrification of all tested blastocysts. Mosaicism was detected in 48/157 (31%) embryos, alone or in