Study question: Do euploid and aneuploid embryos have differences of KIDScore D5 value?

Summary answer: Morphokinetic analysis may reveal associations between embryo development to the blastocyst stage and ploidy status. Euploid embryos had higher KIDScoreD5 values.

What is known already: Time-lapse technology has allowed us to obtain a lot of information about human embryo development. Furthermore, many morphokinetic parameters have been tested in relation to a variety of outcomes including implantation potential, blastocyst development, and ploidy status. Conflicting results regarding potential relationships between morphokinetics and embryo ploidy status, between morphokinetics and embryo implantation potential have been published. Vitrolife has developed the KIDScore D5 algorithm using a large multicenter dataset for predicting implantation with time lapse assessment during culturing in the Embryoscope Plus.

Study design, size, duration: This retrospective study included 94 cycles with aneuploidy screening (PGT-A) performed from March to November 2021. All embryos were cultured in the Embryoscope Plus and all good quality embryos were biopsied on day 5 or 6. Every biopsied embryo was evaluated by the Guided Annotation KIDScore D5 algorithm. Embryos with the highest KIDScoreD5 value were tested for PGT-A first. We have compared the KIDScore D5 values of 280 genetically tested embryos.

Participants/materials, setting, methods: Genetic testing was carried out using the NGS method. All embryos were cultured in the same culture media in Embryoscope Plus incubator till day 5 or 6. Every biopsied embryo was evaluated by the Guided Annotation KIDScore D5 algorithm, which took into account: pronuclei number, t2, t3, t4, t5, tB, ICM and TE grade.

Main results and the role of chance: One hundred and thirty (46%) embryos were euploid, 125 (45%) aneuploid and 24 (9%) mosaic. The average KIDScoreD5 value of euploid embryos was significantly higher than that of the aneuploid embryos (6.9±0.1 versus 6.1±0.1, p = 0.000012). There were no significant differences between the average KIDScoreD5 value of euploid - mosaic and aneuploid - mosaic embryos (6.9±0.1 and 6.1±0.3; 6.1±0.1 and 6.1±0.3 accordingly). Also we have assessed possible differences of KIDScoreD5 value of genetic tested embryos depending on patient age. There were 52 cycles (175 embryos) in the younger age group (<38 y.o.) and 42 cycles (105 embryos) in the older age group (≥38 y.o.). The euploidy rate was 61% in younger age group and 23% in older age group, the levels of aneuploid and mosaic
embryos were 33%, 6% and 64%, 13% accordingly. The average KIDScoreD5 value of the euploid embryos in the younger age group was statistically significantly higher than of the aneuploid embryos (7.0±0.1 versus 6.3±0.2, p = 0.0038), and didn’t statistically differ from the average KIDScoreD5 value of mosaic embryos (6.5±0.6). There were no statistically significant differences of the average KIDScoreD5 value of euploid, aneuploid and mosaic embryos in aged patients (6.6±0.4, 6.0±0.1 and 5.7±0.38 accordingly).

**Limitations, reasons for caution:** We need more data to assess the possible prediction rate of KIDScoreD5 value for ploidy status of embryos in each individual case. First we should evaluate the relationship between the embryo morphokinetic parameters and the individual patient features (hormone levels, stimulation protocol, BMI, etc).

**Wider implications of the findings:** The combination of PGT-A and time-lapse morphokinetic assessment (KIDScoreD5 particularly) allows us to range the embryos and identify euploid embryos more effective and thus it allows us to decrease the cost of the ART treatment, especially for younger aged patients (<38 y.o.) with a large number of good quality embryos.

**Trial registration number:** not applicable