Introduction: To transfer or not transfer…a mosaic embryo, that is the question

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This issue's Views and Reviews section aims to offer readers a 360° view of the knowledge accumulated regarding the transfer of mosaic embryos by experts from around the world, as well as an in vitro fertilization worldwide survey on the topic. (Fertil Steril® 2017;107: 1083–4. ©2017 by American Society for Reproductive Medicine.)
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Mosaicism is not a new feature in the adult or in the embryo; what is new is figuring out how to make the right decision regarding whether or not to transfer an embryo diagnosed as mosaic. In this section the reader will see that due to the intrinsic nature of mosaicism the results in the trophectoderm (TE) biopsy do not necessarily represent the entire embryo, the rest of the TE cells, or the inner cell mass constitution. Mosaic embryos can be considered to represent a distinct category in terms of viability, lying in between euploid and fully abnormal embryos. According to Igenomix's internal data, they represent 6% to 8.5% of the total analyzed embryos, although some groups reported up to 21% with the same high resolution using commercially available next generation sequencing (NGS) platforms. This category of mosaic embryos is characterized by decreased implantation and pregnancy potential, as well as increased risk of miscarriage rate and adverse perinatal outcomes. A survey was given to 102 in vitro fertilization (IVF) centers from 32 countries that perform 108,900 IVF cycles annually and most of these participating centers reported this new category corresponds to <10% of their analyzed embryos.

Whether to or not to transfer a mosaic embryo depends on key factors such as the methodology used, the degree of mosaicism, the chromosomes affected, the cohort of sibling embryos, and finally, the medical history and expectation of the patient. Nowadays, the methodology in use is NGS. Regardless of the commercial platform used, the sensitivity to detect mosaicism within diploid/aneuploid cells in the same embryo is related to the limit of detection (the smallest number of aneuploidy cells detectable in a mix of euploid and aneuploidy cells). Next generation sequencing can detect mosaicism when as few as 20% of the cells are aneuploid but with reduced reliability overall when compared to 50% aneuploidy, where detection success reached 100%. It leads us to conclude a value below the 20% threshold is considered transferable and the embryo is considered euploid, whereas above 50% is not transferable and the cell mosaic is considered aneuploid. The decision-making struggle occurs between mosaicisms rates of 20% to 50%. This is when the experience of the embryology team performing the TE biopsy and the genetic laboratory considering the impact of the chromosome(s) affected is crucial. Even considering the previous statements, a diagnosis of certainty for mosaicism is conceptually impracticable because TE biopsy will not unequivocally represent the mosaicism rate present within the whole embryo. Certainly, the challenge is important requiring more effort by the clinical community to understand our limits or to improve our technology analyzing conceptually the complete embryo, not just a piece of it. But it is not fair to use this challenge to discredit the chromosomal analysis of the human embryos as useless.

This purpose of this Views and Reviews section is to offer readers a 360° view of the knowledge accumulated on this topic by experts from

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around the world, as well as an IVF worldwide survey on the topic. With this information, we aim to find common ground regarding the decision-making process involved in whether or not to transfer a mosaic embryo, to raise awareness of the continental societies for a task force to work with expert teams on this unsolved problem; and the follow-up for their reproductive, obstetric and neonatal outcome.