

Mosaic Embryo Transfers – A Compiled Analysis of Published Data

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Introduction:

Modern PGT-A methods make it possible to identify mixes of aneuploid and euploid cells in trophectoderm biopsies. In such instances the source embryos are classified as mosaic. IVF clinics must decide whether those samples should be considered for transfer. Different groups have published their observations on mosaic embryo transfers. We provide a comprehensive review of those reports and perform a combined evaluation of the data with the goal of achieving a higher-powered analysis.

Materials and Methods:

We retrieved information on mosaic embryo transfers from the published literature, and analyzed the compiled data.

Results:

Analysis of 312 mosaic embryo transfers indicate successful clinical outcomes, albeit with inferior implantation rates and incidences of ongoing pregnancy/birth (OP/B) compared to euploid embryos (45.8% vs 62.6% implantation rates, 35.3% vs 55.2% OP/B rates, $n=312$ mosaic embryos and $n=1774$ control group, $P < 0.01$ for both outcomes). The amassed data reveals the parameters of mosaicism that significantly influence clinical outcome (See tables). Level of mosaicism, which is the estimate of percent aneuploid cells in the biopsy sample, is insignificant when using 40% as the cutoff between low and high groups. A trend correlating poorer clinical outcome with high levels becomes apparent when using 50% as the cutoff, but is nonetheless statistically insignificant. Maternal age does not affect outcomes in a significant way, and comparison of mosaic single whole chromosome monosomies (losses) versus trisomies (gains) shows statistically insignificant differences in clinical outcomes. The type of mosaicism has a significant effect on outcome. While segmental mosaics show similar clinical outcomes compared to mosaics with one or two affected chromosomes, these groups result in significantly more favorable outcomes than complex mosaics in which more than two chromosomes are affected.

Conclusions:

Compiled data from the different published studies on the subject unequivocally show that mosaic embryos should be considered for transfer when no euploid embryos are available. Complex mosaic samples should be deprioritized, but can still result in implantation and births. Additional reports will be needed to definitively conclude

whether the noted trend between percent aneuploidy and inferior outcomes is real or not. In summary, this compiled data analysis can be a resource for mosaic embryo selection in the clinic.

General	Mosaic Embryos Transferred (n)	Control Group (n)	Mosaic Embryos Implantation (%)	Control Group Implantation (%)	<i>P</i>	Mosaic Embryos OP/B (%)	Control Group OP/B (%)	<i>P</i>
	312	1774	45.8%	62.6%	<0.0001	35.3%	55.2%	<0.0001
Mosaic Levels 40	≤40 (n)	>40 (n)	≤40 Implantation (%)	>40 Implantation (%)	<i>P</i>	≤40 OP/B (%)	>40 OP/B (%)	<i>P</i>
	223	98	47.5%	37.8%	0.114	37.7%	28.6%	0.128
Mosaic Levels 50	<50 (n)	≥50 (n)	<50 Implantation (%)	≥50 Implantation (%)	<i>P</i>	<50 OP/B (%)	≥50 OP/B (%)	<i>P</i>
	240	81	47.5%	35.8%	0.0715	37.9%	25.9%	0.0591
Age	≤34 (n)	>34 (n)	≤34 Implantation (%)	>34 Implantation (%)	<i>P</i>	≤34 OP/B (%)	>34 OP/B (%)	<i>P</i>
	85	157	51.8%	42.0%	0.1764	38.8%	33.1%	0.3994
Losses vs Gains	Losses (n)	Gains (n)	Losses Implantation (%)	Gains Implantation (%)	<i>P</i>	Losses OP/B (%)	Gains OP/B (%)	<i>P</i>
	80	47	52.5%	48.9%	0.7169	37.5%	38.3%	1.00

Type	Segmental (n)	1 or 2 Whole Chr (n)	Complex (>2)	Segmental Implantation (%)	1 or 2 Whole Chr Implantation (%)	Complex Implantation (%)	<i>P</i> (Complex vs Rest)	Segmental OP/B (%)	1 or 2 Whole Chr OP/B (%)	Complex OP/B (%)	<i>P</i> (Complex vs Rest)
	87	181	53	49.4%	49.2%	20.8%	0.0001	36.8%	39.8%	13.2%	<0.0001