Mosaic embryos: is it worth re-biopsying them?

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Introduction: Trophectoderm biopsy allows the detection of certain levels of mosaicism. However, its clinical significance is yet to be determined although healthy live births have been obtained by the transfer of euploid-aneuploid mosaic embryos. The decision to transfer euploid-aneuploid mosaic blastocysts should be taken considering the chromosomal anomaly and chromosomes involved.

Objective: To determine whether the performance of a second biopsy and analysis is useful and efficient in mosaic embryos in order to get additional information on mosaicism and better assess their eligibility for transfer.

Methodes:

- In our PGS program, biopsied blastocysts are vitrified until diagnosis is performed. From January 2015 to April 2017, PGS patients with mosaic blastocysts were offered the possibility of warming such embryos and perform a second biopsy to obtain more information about their chromosomal constitution and better assess their possible use for transfer.

- Nineteen patients agreed to the warming of 23 mosaic blastocysts to perform a second biopsy. After warming, surviving blastocysts were cultured until re-expansion. Embryos not re-expanded on day 7 were discarded. Trophectoderm cells from re-expanding blastocysts were biopsied using laser thermolysis before blastocyst re-vitrification. The analysis was performed by aCGH.

Results

PROCEDURE EFFICIENCY

Survival to warming:
100% (23/23)

Re-expansion:
87.0% (20/23)

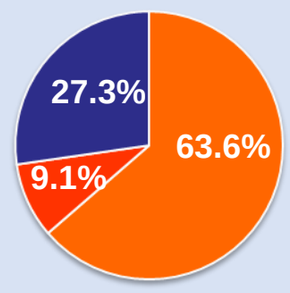
Re-biopsy survival:
100% (20/20)

Embryos with results after re-biopsy:
100% (20/20)

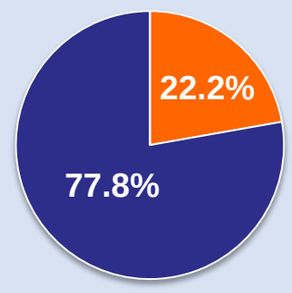
WHOLE-CHROMOSOME MOSAICISM			
EMBRYO	BIOPSY 1	BIOPSY 2	CONCORDANCE
1	MOSAIC +13	MOSAIC +13	YES
2	MOSAIC +4,+14	MOSAIC +5,+14	PARTIAL
3	MOSAIC +14	MOSAIC -13	NO
4	MOSAIC -11	FULL+11	COMPLEMENTARY
5	MOSAIC -17	MOSAIC -17	YES
6	MOSAIC +14	EUPLOID	NO
7	MOSAIC -18	MOSAIC -18	YES
8	MOSAIC +19	EUPLOID	NO
9	MOSAIC +13	EUPLOID	NO
10	MOSAIC +X (XY)	MOSAIC +X (XY)	YES
11	MOSAIC -22	FULL -22	YES

SEGMENTAL MOSAICISM			
EMBRYO	BIOPSY 1	BIOPSY 2	CONCORDANCE
1	MOSAIC -4q	EUPLOID	NO
2	MOSAIC +1q	EUPLOID	NO
3	MOSAIC +20p	MOSAIC -20p	COMPLEMENTARY
4	MOSAIC +1p	EUPLOID	NO
5	MOSAIC –Xq (XX)	EUPLOID	NO
6	MOSAIC +8q	EUPLOID	NO
7	MOSAIC -10q	EUPLOID	NO
8	MOSAIC -5q	MOSAIC -5q	YES
9	MOSAIC +6q	EUPLOID	NO

WHOLE-CHR MOSAICISM



Euploid 2nd result
Confirmed mosaicism
Mosaicism ≠ chromosome



SEGMENTAL MOSAICISM

Conclusions:

→ Re-biopsy of mosaic blastocysts is an efficient and useful approach in order to allow a more precise diagnosis and ultimately give patients a better counseling.

→ When transferring mosaic blastocysts, embryos with segmental mosaicism should be those first selected.

→ Independently from the second result, embryos should still be considered as mosaic, although their reproductive prognosis might be different depending on it.