Which blastocysts should be considered for genetic screening?

Given the exciting rapid evolution of genetic technology we, along with many others, are contemplating the idea of preimplantation genetic screening of all blastocysts. In this context we were interested in the recent paper by Fiorentino et al., 2014). They reported on the application of both array-comparative genomic hydridization (CGH) and next generation sequencing (NGS) using instrumentation from Illumina, Inc. They showed 99.5% concordance between the 2 technologies and 38.5% of embryos having trophectoderm biopsy proved euploid. Following the transfer of 50 screened embryos in 47 women, they had 32 clinical implantations (64.0%) with all those cases proceeding to livebirths.

Before expending the rather large financial outlay in setting up similar technology in our own facility, we would like to initiate a debate by presenting data showing that morphological assessment of blastocysts can provide similar high implantation rates. Our data, which is supplemental to a larger study (Yovich et al, 2015), questions the relevance of applying the advanced genetics in facilities that already have high implantation rates.

Table 1 shows the implantation rates from 529 single embryo transfers in a hormone controlled cycle where vitrified embryos were warmed utilising the Cryotop method (Kuwayama et al, 2005). It can be seen that those embryos graded 4AA or 5AA on morphological criteria implant at 63-65% level; i.e. equivalent to the genetically screened embryos reported by Fiorentino et al. Figure 1 shows the regression line for blastocysts of all gradings, indicating that there is a reliable predictive value in these gradings ($R^2 = 0.9715$). Perhaps only those embryos graded in the Modest to Medium groupings should be considered for genetic screening. Blastocysts categorised in the High group and Top groups will not benefit from screening as the chance of a healthy livebirth is not improved.

Blastocyst scores	**6BB**	**6BA**	**6AB**	**4BB**	**5BB**	**3BB**	**6AA**	**5BA**	**3BA**	**3AA**	**5AB**	**4AB**	**4BA**	**3AB**	**5AA**	**4AA**	**Total**
Blastocyst groups	Low group <30%			Modest group 30 to 39%			Medium group 40 to 49%					High group 50 to 59%			Top group 60 to 69%		
#CP	0	0	0	13	4	8	2	10	6	13	12	46	24	41	37	55	**271**
# Transfers	2	2	2	41	12	22	5	23	13	28	25	89	45	76	59	85	**529**
PR	0%	0%	0%	32%	33%	36%	40%	43%	46%	46%	48%	52%	53%	54%	63%	65%	**51%**
# LB	0	0	0	10	1	5	1	8	2	6	7	36	19	32	31	47	**205**
LB Rate	0%	0%	0%	24.4%	8.3%	22.7%	20.0%	34.8%	15.4%	21.4%	28.0%	40.4%	42.2%	42.1%	52.5%	55.3%	**39%**

Table 1
Clinical pregnancies and livebirths according to blastocyst grading categorized from lowest to highest pregnancy rate following single embryo transfer. The blastocyst groups are categorized according to implantation rates. (CP, clinical pregnancy; PR, pregnancy rate; LB, livebirth). Data derived from Yovich et al, 2015.

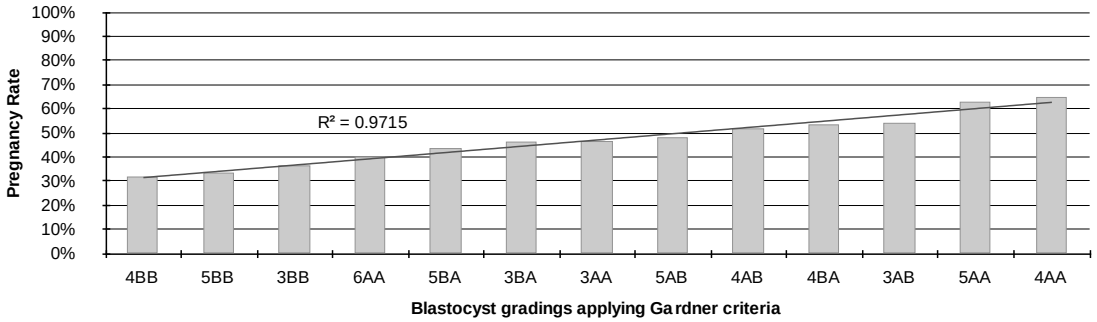

Figure 1
Pregnancy rate from single vitrified blastocyst transfer according to post-warm blastocyst grading at time of transfer, categorised from lowest to highest implantation ratings. Three groups excluded with no pregnancies from 6 transfers – hatched blastocysts 6BB, 6BA and 6AB

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Kuwayama M, Vajta G, Kato O, Leibo S. Highly efficient vitrification method for cryopreservation of human oocytes. *Reprod. Med. Online* 2005; **11**: 300–08.

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