

Human Embryo Culture Dilemma Continues: “Back to Nature” or “Let the Embryo Choose”

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The preimplantation mammalian embryo in culture appears to be sensitive to epigenetic, metabolic, cellular, physiologic and other environmental influences. Research conducted over the last decade has led to significant improvements in embryo culture media composition.

Two distinct approaches to culturing embryos to the blastocyst stage have emerged. The first is a “back to nature” approach [1] and the second, the “let the embryo choose” approach [2]. Initially, the “back to nature” or “sequential embryo culture method” which had been successfully to the growth of mouse, bovine and human zygotes to the blastocyst stage [3,4] was favored for human IVF. However, moving embryos from one medium to another probably adds significant stress to the developing embryo in-culture. Moreover, this approach is quite labor intensive and expensive. In 2002, Biggers et al. [5] demonstrated that a “one step approach, where the embryo is continuously grown (without being moved) in the same media, was at least as successful as when embryos were moved through sequential media in the process of growing them to blastocysts. He reported on the fact that this approach simplified routine embryo culture with no apparent disadvantages.

Table 1 compares the “one-step culture protocol” with “sequential culturing” in 7700 IVF cycles conducted at seven Sher Institutes for Reproductive Medicine (SIRM) IVF programs between 2004 and 2010.

As shown in the Table 1, in age groups <35 and 38-40yrs, “one step culturing” yielded significantly improved pregnancy rates (χ^2 , $p < 0.05$) while in other age categories there was no significant difference. Also, multiple pregnancy and miscarriage rates with the “one step culture” protocol were lower in the 38-40 yrs age category. There were no apparent differences in the other categories.

This data strongly suggests that a “one step embryo culture”

Age group (yrs)	<35		35-37		38-40		41-42		OD	
	S	C	S	C	S	C	S	C	S	C
N	1292	1907	590	994	596	942	290	500	232	401
Clinical Pregnancy %	40 *	51 **	41	46	27 *	44 **	27	29	68	72
Multiple pregnancy %	35	38	38	36	36 *	23 **	11	12	44	37
Miscarriage %	17	14	19	16	29 *	16 **	23	29	3	4

OD: ovum donor; S: sequential culture; C: single step culture; different superscripts denote statistical significance at $p < 0.05$

Table 1: Comparative clinical outcome (by age group) using “sequential” vs. “one step embryo culturing.

protocol could provide improved clinical pregnancy rate as well as lower multiple pregnancy and miscarriage rates. It also provides evidence that the preimplantation human embryo can be successfully cultured using a “one step protocol”. Furthermore embryos cultured in this manner show excellent blastocyst formation improved implantation potential and higher live birth rates.

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