Standardization of grading embryo morphology

Standardization of morphologic assessment for an embryo grading system was developed and is being implemented by the Society for Assisted Reproductive Technology (SART). A recent European consensus conference of embryologists from Europe and America is working toward adopting an embryo classification system modeled similarly to that of SART that, if adopted, would produce a de facto international standard to aid cross-border collaboration. (Fertil Steril® 2010;94:1152–3. ©2010 by American Society for Reproductive Medicine.)

We write with regard to implementation of international standards for grading and reporting embryo quality in assisted reproductive technology (ART) laboratories. This year marks a turning point in the history of grading preimplantation embryos. First, in the United States, the Society for Assisted Reproductive Technology (SART) mandated reporting of embryo grade. This resulted from efforts of a SART Embryo Morphology Subcommittee, composed of embryologists and a clinician, who devised a simple standardized grading system that can be easily implemented in any ART laboratory. Second, last February, an initiative by the international society Alpha brought together a group of embryologists to garner consensus on embryo grading in Europe.

There have been numerous systems devised to grade and rank embryos (reviewed by Boiso et al. [1] and Gardner et al. [2]). Simple grading systems assign one grade to account for the overall appearance of the cleavage-stage embryo, taking into account cell symmetry and fragmentation (3). More complex systems use a formula to predict pregnancy likelihood according to the appearance and development of an embryo (4). More recent studies with cleavage-stage embryos have evaluated the utility of assessing embryos on multiple days or only just before ET (5–7). For embryos at the blastocyst stage, grading usually takes into account the morphology of the inner cell mass and trophoderm, as well as the degree of expansion of the blastocyst cavity (8). Despite the number and complexity of these and other grading systems, no convention exists for assigning α or numeric scores or for what represents a high or a low grade (reviewed by Ceyhan et al. [9]).

Embryo morphology fields were added to the SART database in response to a request by SART member programs in 2004. This request was made because of concerns among the membership that despite SART discouraging interprogram success rate comparisons, such comparisons are made, and there was no direct way to benchmark differences in patient populations. Because embryo quality, as determined by morphology, bears a significant relation to implantation potential, it was decided that reporting of morphology fields could provide a mechanism to aid the assessment of patient reproductive potential. Moreover, it was thought that such collection would standardize grading systems among clinics, thereby improving quality-assurance and quality-improvement activities. Ultimately, this information may be used to reduce the number of embryos transferred and in turn lower the multiple pregnancy rates—including twin pregnancies. Recognizing the potential worth of standardizing embryo grading across SART member programs, the 2005 SART Executive Council charged our subcommittee with developing a grading system for the SART database (SARTCORS). The subcommittee realized that the embryo grading system must be [1] simple, [2] composed of fields that have a basis in scientific inquiry with some proven predictive value,
and [3] easily adopted in laboratories not routinely capturing these parameters. A three-point grading system (good, fair, and poor) was developed and accompanied by a method for staging embryos using morphologic features (Table 1).

Voluntary collection of the stage and grade of transferred embryos was initiated in June 2006 for SART member clinics. Two analyses of the data, one involving 7,000 embryos, the other 70,000, both provided robust associations between stage and grade of day-3 embryos with implantation and live birth rates (10, 11), and collections into SARTCORS became mandatory as of March 2010. Although several other countries (such as the United Kingdom and Spain) already use standardized embryo grading systems, the Alpha consensus conference (Joint Alpha/European Society of Human Reproduction and Embryology Consensus Workshop on Embryo Assessment; Istanbul, Turkey; February 26, 2010) recognized the need for standardization across Europe. We are pleased that these countries seem favorably disposed to utilization of a standardized system virtually identical to the SARTCORS system. Such international standardization should allow collaborative efforts across borders involving very large numbers of cycles, for the investigation of population-specific questions regarding relationships among embryo morphology and cycle outcomes in the short term, and health of the offspring in the long term.

**REFERENCES**

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