Embryo Morphology - SART Grading

Embryo Morphology Assessment includes two parts: an Overall Grade and the Stage. Overall grading is a subjective assessment of the overall quality of the embryo as good, fair or poor, and is based on assessment of certain characteristics of the embryo, such as fragmentation, symmetry, inner cell mass (ICM) quality or trophectoderm quality. Stage-dependent grading involves determining the developmental stage of the embryo.

OVERALL GRADE

Embryos are to be graded into one of three classes: Good, Fair or Poor.

Good	Embryo free of imperfections or with only minor imperfections.
Fair	Embryo lacking exceptional quality but not excessively imperfect either.
Poor	Embryo with numerous imperfections.

STAGE

First the embryo stage is recorded

1 Cell	A single fertilized oocyte. The 2 pronuclei may or may not be visible (zygote).
>1 Cell	A cleavage stage embryo with at least 2 blastomeres; classified as 2-cells, 3-cells, 4-cells, 5-cells, 6-cells, 7-cells, 8-cells and >8-cells.
Morula	An embryo where the blastomeres adhere to each other as such that it is not possible to clearly identify individual cells. An embryo undergoing the compaction process.
Early Blastocyst	The presence of a small fluid-filled cavity (blastocoel).
Blastocyst	An embryo composed of a number of blastomeres organized around a discernible blastocoel of any size.
Hatching Blastocyst	Embryo partially or completely free of the zona pellucida. The embryo is composed of trophectoderm and inner cell mass cells and has a large expanded blastocoel.

>1 Cell Stage

Two values are collected, symmetry and fragmentation, for these multicellular embryos that are between a 1-cell embryo and a morula.

Fragmentation

A fragment is a small detached anuclear portion of a blastomere (cytoplasmic bleb). Fragmentation receives one of the following four scores:

0%	No fragments or blebs present.
1-10%	Fragments compose 1-10% of the embryonic volume.
11-25%	Fragments compose 11-25% of the embryonic volume.
25%	Fragments compose greater than 25% of the embryonic volume.

Cell Symmetry

For embryos with an even number of cells, blastomeres should be of equal size. For embryos with an odd number of cells, blastomeres may not be the same size but they should be of the appropriate size for their cleavage status.

Perfect	All blastomeres are of the appropriate size and shape.
Moderate	0-20% of the blastomeres are not of the appropriate size and shape.
Severe	>20% of the blastomeres are not of the appropriate size and shape.

Morula Stage

For day 4 or 5 transfer of morula, 2 values are entered: morphology and fragmentation.

Morphology

Morulae are classified by the extent of compaction as either Incomplete Compaction or Compacted, as well as the extent of fragmentation.

Incomplete Compaction	Some of the blastomeres or parts of the blastomeres are still distinct as individual cells while other areas appear as an amorphous mass.
Compacted	Complete compaction. The entire embryo appears as an amorphous mass and there is no discernable blastocoel present.

Fragmentation

A fragment is a small, detached, anuclear portion of a blastomere (cytoplasmic bleb).

0%	No fragments or blebs present.
1-10%	Fragments compose 1-10% of the embryonic volume.
11-25%	Fragments compose 11-25% of the embryonic volume.
25%	Fragments compose greater than 25% of the embryonic volume.

Early Blastocyst, Blastocyst or Hatching Blastocyst Stage

For day 4, 5 and 6 transfers of a blastocyst stage embryo (an embryo composed of blastomeres organized around a discernable blastocoel of any size), 2 values are collected: inner cell mass grade and trophoblast grade.

Inner Cell Mass

Good	An excellent to high quality ICM with a large number of cells in a single distinct structure.
Fair	An ICM with a moderate number of cells or organization. Lacking exceptional quality but not excessively imperfect either.
Poor	An inferior quality ICM. An ICM with few cells or a blastocyst without an identifiable ICM.

Trophoblast

Good	An excellent to high quality trophoblast with a large continuous and uniform layer of cells in a single distinct structure.
Fair	A moderate number of cells that may have variable size and shape.
Poor	An inferior quality trophoblast with few cells or with gaps (non-contiguous layer).

Two additional selections are possible for most fields:
Not Entered - Information was not entered or recorded.
Unknown - Embryo assessment was not performed.