

Having described the invention, we claim:

1. A method for assigning a quality parameter to a reproductive cellular structure, comprising:
 - obtaining an image of the reproductive cellular structure;
 - providing the image of the reproductive cellular structure to a neural network to generate a value representing a morphology of the reproductive cellular structure;
 - comparing the value to a predefined standard to provide a quality assurance metric representing one of a medical personnel, a facility, a growth medium, and an identity of the reproductive cellular structure.
2. The method of claim 1, wherein the image of the reproductive cellular structure is a first image of the reproductive cellular structure, captured at a first time, the method further comprising:
 - obtaining a second image of the reproductive cellular structure at a second time preceding the first time; and
 - providing the second image of the reproductive cellular structure to the neural network to generate the predefined standard.
3. The method of claim 2, wherein the quality assurance metric is a categorical value having a first value, indicating that the first image and the second image represent a same reproductive cellular structure, when the unique key matches the predefined standard, and a second value, indicating that the first image and the second image represent different reproductive cellular structures, when the unique key does not match the predefined standard.
4. The method of claim 2, further comprising:
 - encoding the predefined standard on a radio frequency identification (RFID) tag; and
 - affixing the RFID tag to a dish storing the reproductive cellular structure.
5. The method of claim 1, wherein obtaining the image of the reproductive cellular structure comprises obtaining a plurality of images representing the reproductive cellular structure and providing the image of the reproductive cellular

structure to the neural network comprises providing each of the plurality of images to the neural network to generate a plurality of values representing the morphology of the plurality of reproductive cellular structures.

6. The method of claim 5, further comprising generating a representative value from the plurality of values representing the morphology of the plurality of reproductive cellular structures and comparing the representative value to the predefined standard.

7. The method of claim 6, wherein the reproductive cellular structure is an embryo, and the representative value represents a likelihood that implantation of the embryo will result in a successful pregnancy.

8. The method of claim 1, wherein obtaining the image of the reproductive cellular structure comprises obtaining a plurality of images representing a respective plurality of reproductive cellular structures and providing the image of the reproductive cellular structure to the neural network comprises providing each of the plurality of images to the neural network to generate a plurality of values representing the morphology of the plurality of reproductive cellular structures.

9. The method of claim 8, wherein each of the plurality of reproductive cellular structure is an embryo and the plurality of values representing the morphology of the plurality of reproductive cellular structures each represent the likelihood that implantation of their respective embryo will result in a successful pregnancy.

10. The method of claim 9, wherein the plurality of embryos were all cultured in a given growth medium, the representative value represents a percentage of the plurality of embryos for which implantation of the embryo is expected to result in a successful pregnancy, and the predefined standard is a threshold percentage, the method further comprising alerting a user when the representative value falls below the threshold percentage.

11. The method of claim 9, wherein the plurality of embryos were all fertilized by a given embryologist, the representative value represents a percentage of the plurality of embryos for which implantation of the embryo is expected to result in a successful pregnancy, and the predefined standard is a threshold percentage, the method further comprising alerting a user when the representative value falls below the threshold percentage.

12. A system comprising:

- a processor;

- an output device; and

- a non-transitory computer readable medium storing machine executable instructions for assigning a quality assurance metric to an embryo, the machine executable instructions comprising:

 - an imager interface that receives an image of the embryo from an associated imager;

 - a convolutional neural network that determines, from the image of the embryo, a value representing a likelihood of a successful outcome for the embryo;

 - a quality analysis component that calculates a value representing the performance of one of a medical professional, a facility, and a growth medium across a plurality of embryos and compares the value to a threshold value to generate the quality assurance metric; and

 - a user interface that displays the quality assurance metric to a user at the output device.

13. The system of claim 12, wherein the convolutional neural network determines the value representing the likelihood of a successful outcome for the embryo as a categorical parameter, the quality analysis component determining the value representing the performance of the one of the medical professional, the facility, and the growth medium as a percentage of embryos of the plurality of embryos for which the convolution neural network assigns a first value as the value representing the likelihood of a successful outcome for the embryo.

14. The system of claim 12, wherein the convolutional neural network determines a value representing a likelihood of a successful pregnancy upon implantation of the embryo.

15. The system of claim 12, wherein the convolutional neural network is trained on a plurality of images taken of embryos on the first day of development, and the quality analysis component that calculates a value representing the performance of the growth medium.

16. The system of claim 12, wherein the convolutional neural network is trained on a plurality of images taken of embryos on the third day of development, and the quality analysis component that calculates a value representing the performance of one of the medical professional and the facility.

17. A system comprising:

a processor;

an output device; and

a non-transitory computer readable medium storing machine executable instructions for assigning a value representing a quality of an oocyte, the machine executable instructions comprising:

an imager interface that receives an image of the oocyte from an associated imager;

a convolutional neural network that determines, from the image of the oocyte, a value representing one of a likelihood of successful fertilization of the oocyte and a location of the polar body of the oocyte; and

a user interface that displays the value representing the one of the likelihood of successful fertilization of the oocyte and the location of the polar body of the oocyte to a user at the output device.

18. The system of claim 17, wherein the value represents the likelihood of successful fertilization of the oocyte, and the convolutional neural network is trained on a plurality of images taken of oocytes, each labeled with a fertilization class determined eighteen hours after insemination.

19. The system of claim 17, further comprising a quality analysis component that generates an expected rate of successful fertilization from a plurality of values representing likelihoods of successful fertilization across a plurality of oocytes, and calculates a value representing the performance of one of a medical professional and a facility across the plurality of oocytes given the expected rate of successful fertilization.

20. The system of claim 17, wherein the value represents the location of the polar body of the oocyte, and the convolutional neural network is trained on a plurality of images taken of oocytes, each labeled with a class representing a section of the oocyte in which the polar body is located.