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Oral Presentations

O-32
Morphological evaluation of oocytes with image processing methods in patients undergoing intracytoplasmic sperm injection

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Background: Morphological assessment of oocyte quality is one of the most essential and sensitive steps in infertility treatment and deciding on treatment type. Oocytes abnormalities can be seen and detected under a microscope by embryologists. Diagnosis of the type and severity of abnormalities in in vitro fertilization centers is done by embryologists. Diagnosis is based on the appearance of the egg and according to scientific standards. Factors such as fatigue, inexperience and taste can cause differences in the outcome. Using image processing and morphological detection techniques, the egg and its cytoplasm can be identified and its features extracted. Finally, with the help of the decision tree, the normal egg can be distinguished from abnormal.

Objective: This study aimed to evaluate human oocyte abnormalities by image processing. Our goal was to develop a diagnostic tool that can analyze microscope images of human oocytes and derive a detection of the oocyte cytoplasm and zona-pellucida that is functional for quality evaluation in assisted insemination.

Materials and Methods: The approach of the present study includes four main phases: 1) segmentation, 2) feature extraction, 3) learning model (decision tree), and 4) model assessment. In the segmentation phase we use two algorithms, first, the oocyte was identified, and then the required features are extracted with the help of the second algorithm using the Hough transform. In the second phase, the extracted features are used to diagnose oocytes according to 11 different, including cytoplasmic and zona-pellucida abnormalities. This approach is made by wavelet transforming and Fourier-conversion. To this aim, we evaluate some statistics in the Haar wavelet transform domain. In the third phase, the normal oocyte was distinguished using decision tree model learning from the abnormal. Finally, a program was written using the Python programming language that has the ability to distinguish normal from abnormal oocyte.

Results: In this study, using innovative oocyte and cytoplasm algorithms, it was identified with great accuracy. 700 photos were received from Mehr Infertility Center Rasht. In all cases, the designed algorithms succeeded in distinguishing normal from abnormal oocyte. Software was developed using the Python programming language to distinguish normal from abnormal oocyte.

Conclusion: This study reported experimental results on a collection of microscope images of oocytes Indicated the proposed approach's effectiveness. It seems that, measuring the quality of oocytes with image processing helps classify oocytes into normal and abnormal without human intervention.

Key words: *Biomedical image processing, Decision tree, Human oocyte, Intracytoplasmic sperm injection.*

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