EMBRYO CELL DIVISION TRACKING AND ANALYSIS

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1 Application

The main application is going to use to perform image analysis in *MATLAB*. *MATLAB* is a high-level language and interactive environment for numerical computation, visualization, and programming. *MATLAB* provides variety built-in function which can be used to preform basic image processing operations and helps user step further to the aimed results. Also, it is suitable and convenient to create customized functions by individual user to overcome the limitation that the built-in tools could not help with.

The images will also be examined using *ImageJ* and *IrfanView*. They are both powerful and professional tools to display, edit, analyze and process different kinds of images, such as TIFF, GIF, JPEG and so on.

2 Challenge

The main challenge of analyzing on embryo cells will be segmentation. The images with low resolution could raise difficulty of reorganization and also since the images are took in gray-scale, the pixel values may close to each other which also increase the difficulty of segmentation. Also when time goes along, the embryo cell division is going to produce large number of individual embryo cells and it is challenge to label and keep track on each cell correctly and accurately.

3 Description

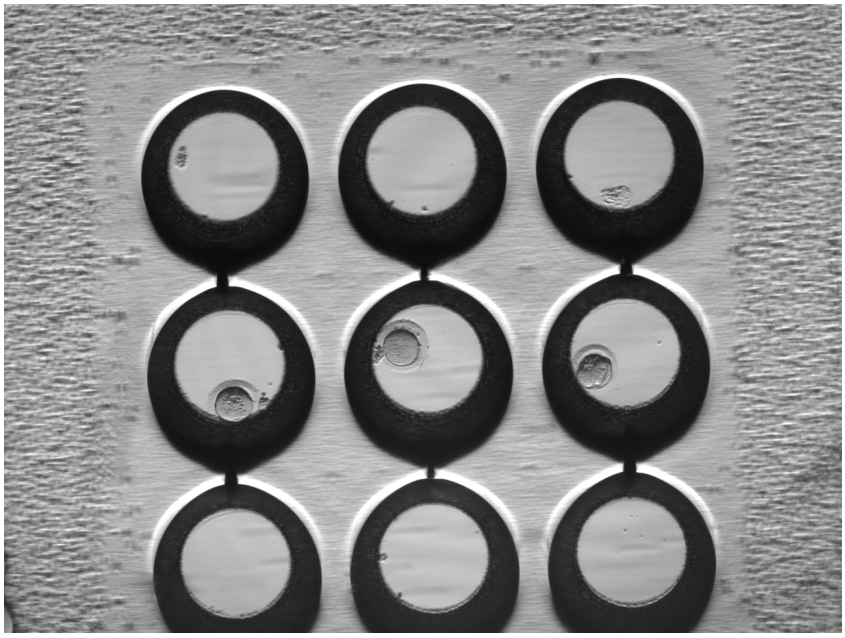
The study of embryo cell never stops during the development of image analysis. Being able to capture the cell division in live embryo can be significantly useful in studying embryo cell development mechanism. It is also interesting that embryo cell can later develop into different types of cells in all around the human body. More practically, based on the large amount of analysis on embryo cell, the medical team can predict the healthiness of the embryo cell and make effort to make it correct if there is anything wrong[1].

4 Aim

The project aims three major targets:

- Capture changes in frames of the embryo cell and mark the cell boundary
- Correctly determine the embryo division at exact time
- Accurately label and track the embryo cell before and after division

Here is one of the raw image which is going to used for the project.



5 Author List

- Connie C Wong, Kevin E Loewke, Nancy L Bossert, Barry Behr, Christopher J De Jonge, Thomas M Baer, Renee A Reijo Pera[1]
- MA Luengo-Oroz, MJ Ledesma-Carbayo, N Peyrieras and A Santos[2]
- Andrew R. Cohen, Mark Winter
- Xiao Peng

6 Reference

[1] Wong, Connie C et al. "Non-Invasive Imaging Of Human Embryos Before Embryonic Genome Activation Predicts Development To The Blastocyst Stage". Nat Biotechnol 28.10 (2010): 1115-1121. Web.
[2] Luengo-Oroz, MA et al. "Image Analysis For Understanding Embryo Development: A Bridge From Microscopy To Biological Insights". Current Opinion in Genetics & Development 21.5 (2011): 630-637. Web.