

CLAIMS:

1. A method for calibrating an imaging system for cellular imaging, the method comprising:

providing an imaging system for imaging cells which have tagged with a fluorophore having a range of fluorescing wavelengths;

performing a calibration for autofluorescence comprising:

providing said imaging system with a sample of unstained cells having a range of autofluorescing wavelengths;

illuminating said sample with a source of illumination;

imaging said sample across a dynamic range including all of said range of fluorescing wavelengths and all of said range of autofluorescing wavelengths;

performing a calibration for chromatic aberration comprising:

providing said imaging system with a sample of cells;

illuminating said sample with a source of illumination;

obtaining a first image of said sample of cells;

altering a position of said imaging system relative to said sample of cells; and

obtaining a new image of said sample of cells.

2. The method of claim 1 wherein:

a minimum photon acquisition time of said imaging system is set separately for each wavelength within said dynamic range; and

said minimum photon acquisition time is sufficient for detection of all values within said complete dynamic range.

3. The method of claim 1 wherein said dynamic range comprises all wavelengths said imaging system images.
4. The method of claim 1 wherein said imaging system comprises a digital grayscale camera.
5. The method of claim 4 wherein said camera is provided with a filterset based on said fluorophore.
6. The method of claim 4 wherein said camera is a High Dynamic Range Imaging (HDRI) camera.
7. The method of claim 4 wherein said camera generates High Dynamic Range (HDR) by exposure fusion to provide for improved contrast.
8. The method of claim 1 wherein said cells which have tagged with said fluorophore are a different type of cells to said unstained cells
9. The method of claim 1 wherein said sample of cells is a different type of cells to said sample of unstained cells.
10. The method of claim 1 wherein said sample of cells is said sample of unstained cells.
11. A method for analyzing a cellular image, the method comprising:
 - providing a sample of cells which have been tagged with a fluorophore having a range of fluorescing wavelengths;
 - illuminating said sample with a source of illumination;
 - imaging said illuminated sample over said range of fluorescing wavelengths to produce a sample image;
 - subtracting a calibration image from said sample image to produce a calibrated image;

representing said image as a topological curve, a height of said curve at each curve pixel representing an intensity of fluorescence at an image pixel in said calibrated image;

searching said topological curve for a pixel grouping having height above a selected height;

choosing a new height, lower than said selected height;

repeating said searching using said new height as said selected height; and

for each identified pixel grouping:

following a convex border of said topological curve away from said

pixel group to an inflection point where inflexion is

decreasing at a convex side; and

identifying said convex border including said pixel group as a cell in said calibrated image.

12. The method of claim 11 wherein said calibration image is formed by a method comprising:

providing said imaging system with a sample of unstained cells having a range of autofluorescing wavelengths;

illuminating said sample with a source of illumination; and

imaging said sample across a dynamic range including all of said range of fluorescing wavelengths and all of said range of autofluorescing wavelengths;

13. The method of claim 12 wherein:

a minimum photon acquisition time of said imaging system is set separately for each wavelength within said dynamic range; and

said minimum photon acquisition time is sufficient for detection of all values within said complete dynamic range.

14. The method of claim 12 wherein said dynamic range comprises all wavelengths said imaging system images.

15. The method of claim 11 further comprising:

Before obtaining said sample image, performing a calibration for chromatic aberration on said imaging system, said calibration comprising:

illuminating said sample of cells with a source of illumination;

obtaining a first image of said sample of cells from said imaging system in a first position;

moving said imaging system to a second different position relative to said sample of cells;

obtaining a second image of said sample of cells; and

when generating said sample image:

positioning said imaging system in said first position if said

first image is optimized compared to said second image; and

placing said imaging system if it is not.

16. The method of claim 11 wherein said imaging system comprises a digital grayscale camera provided with a filterset based on said fluorophore.

17. The method of claim 11 wherein said imaging system comprises a High Dynamic Range Imaging (HDRI) camera.

18. The method of claim 11 wherein said imaging system generates High Dynamic Range (HDR) by exposure fusion to provide for improved contrast.

19. The method of claim 11 wherein said calibrated image is used to train a neural network.