CLAIMS

1. A method of detecting changes in Ca^{2+} levels in a cell, the method comprising:
    a. obtaining a sample comprising cells engineered to express one or more low affinity Ca^{2+} indicator selected from the group consisting of:SEQ ID Nos 12, 14, 16 and 18;
    b. exposing the cells to excitation light; and
    c. detecting changes in endoplastic reticulum (ER), sarcoplastic reticulum (SR) and/or mitochondria Ca^{2+} levels by visualizing or imaging the cells.
2. The method in claim 1, wherein the sample comprises a cell culture or stem cells.
3. The method of claim 2 wherein the sample comprises a cell culture of stable immortalized cell line.
4. The method of claim 3 wherein the cell culture comprises a HL1 cell line.
5. The method in claim 1, wherein the indicator is ratiometric.
6. The method in claim 1, wherein the indicator is intensiometric.
7. The method in any one of claims 1-6, wherein the indicator is used in combination with another fluorescent indicator.
8. The method of claim 7 which uses a single wavelength two-colour imaging method.
9. The method of claim 7 wherein the other fluorescent indicator is a cytoplasmic calcium indicator.
10. The method of any one of claims 1-9, wherein the indicator is targeted to an organelle with an organelle-specific targeting sequence.
11. A low affinity fluorescent Ca^{2+} polypeptide selected from the group consisting of: SEQ ID Nos 12, 14, 16 and 18.
12. The polypeptide of claim 11 further comprising an organelle-specific targeting sequence.
13. The polypeptide of claim 12 comprising the targeting sequence of SEQ ID NO. 19.
14. The polypeptide of claim 11 having a K_d for Ca^{2+} greater than 60 μM.

15. A polynucleotide encoding a polypeptide of one of claims 11 -16.

16. The polynucleotide of claim 17 comprising a nucleic acid sequence selected from the group consisting of

    SEQ ID NO. 11, 13, 15, or 17

    a. .

17. The polynucleotide of claim 15 or 16, further comprising a sequence which encodes an organelle-specific targeting sequence.

18. The polynucleotide of claim 17 wherein the organelle-specific targeting sequence encodes SEQ ID NO. 19.

19. A vector comprising the polynucleotide of one of claims 15-18.

20. A host cell comprising the polynucleotide sequence of one of claims 15-18, or a vector of claim 19.

21. The host cell of claim 20 which is a cardiomyocyte.

22. The host cell of claim 20 which co-expresses another fluorescent calcium indicator.