<u>One pool Ca^{2+} dynamics model[1]:</u>

As per the model, binding of an IP_3 molecule on an IP_3 receptor located on Endoplasmic reticulum (ER) provokes the liberation of Ca^{2+} into the cytosol. This increase in Ca^{2+} triggers the release of Ca^{2+} from another Ca^{2+} sensitive source. Cytosolic Ca^{2+} decreases due to pumping into the Ca^{2+} sensitive store and extrusion from the cell. The IP_3 is assumed to be a constant in the model. The model can be represented by following equations:

$$\frac{dZ}{dt} = V_{in} - V_2 + V_3 + k_f Y - kZ$$

$$\frac{dY}{dt} = V_2 - V_3 - k_f Y$$

with,

$$V_{in} = \nu_0 + \nu_1 \beta$$

$$V_2 = V_{M2} \frac{Z^n}{Z^n + {K_2}^n}$$

$$V_3 = V_{M3} \frac{Z^P}{Z^P + {K_A}^P} \frac{Y^m}{Y^m + {K_R}^m}$$

In these equations V_{in} represents the total constant entry of Ca^{2+} in cytosol; it includes the influx v_0 from extracellular medium and the IP_3 stimulated Ca^{2+} release $v_1\beta$. V_2 and V_3 are respectively the rates of pumping into and release from Ca^{2+} sensitive zone with V_{M2} and V_{M3} determining the maximum rates of these processes. K_2, K_r and K_a are the threshold constants of pumping, release and activation while n, m and p are the hill coefficients. K_fY and kZ refer to the passive efflux from Ca^{2+} sensitive store and from cytosol.

References

1. Dupont G, Goldbeter A. One-pool model for Ca oscillations involving я+ Ca and inositol 1, 4, 5-trisphosphate as. Cell calcium. 1993; 14:311-22.