Electroporation Definitions Guide

AC
Abbreviation for “alternating current” which is an oscillating dielectrophoretic current in which an electrical current rises to a maximum point in one direction and falls to zero and then rises in the opposite direction and then repeats.

AC Alignment
Refers to the use of AC current to align cells prior to electrofusion.

Anode
Positive electrode or terminal of a device from which electrons flow outwards.

Arc
Discharge of electrical current in a sample in which the conductivity is too great.

Capacitor
A device capable of holding an electrostatic charge between two conducting surfaces.

Capacitance
The quantity of electric charge (usually measured in Farads) which a capacitor is capable of receiving with an applied voltage.

Cathode
Negative electrode or terminal of a device to which electrons flow towards.

DC
Abbreviation for “direct current”, which is defined by the constant flow of electrons in a single direction from low to high potential.

DC Pulsing
The application of a DC pulse that is used in electroporation and the fusion step in electrofusion.

Electroporation
Applying an electrical pulse inducing a transmembrane potential which causes a reversible breakdown of the cellular membrane. This results in the formation of pores in the membrane of cells and tissues allowing exogenous molecules such as DNA, siRNA, proteins, or antibodies to enter the cell.

Electrofusion
Using electrical pulses to destabilize cell membranes to create pores and fuse cell membranes together to create a hybrid cell.

Exponential Decay
A wave in which the decay is 1/3 of the maximum peak amplitude of the pulse.

Field Strength
The voltage delivered across the electrode gap. It is expressed as kV/cm. Field strength relates to the potential difference experienced by the cell membrane in the electric field.

Pulse Length
The length of time the cell is exposed to the electrical field. Pulse length is generally believed to be related to the length of time during which the electroporation membrane pores remain open.

RC Time Constant
Product of resistance and capacitance in seconds

Resistance
Opposition to current flow and dissipation of energy in the form of heat, typically measured in Ohms.

Stable Transfection
Integration of nucleic acids into the host chromosomes and the inheritance of associated traits in progeny cells.

Square Wave
A wave form that alternates between two fixed values for an equal amount of time.

Transfection
The introduction of nucleic acids into animal cells either as a stable or transient transfection.

Transformation
The introduction of nucleic acids into bacteria, yeast and plants.

Transient Transfections
Temporary expression of exogenous nucleic acids.