

## *Abstract:*

Cell viability is defined as the number of healthy cells in a sample and proliferation of cells is a vital indicator for understanding the mechanisms in action of certain genes, proteins and pathways involved cell survival or death after exposing to toxic agents. Generally, methods used to determine viability are also common for the detection of cell proliferation. Cell cytotoxicity and proliferation assays are generally used for drug screening to detect whether the test molecules have effects on cell proliferation or display direct cytotoxic effects. Regardless of the type of cell-based assay being used, it is important to know how many viable cells are remaining at the end of the experiment. There are a variety of assay methods based on various cell functions such as enzyme activity, cell membrane permeability, cell adherence, ATP production, co-enzyme production, and nucleotide uptake activity. These methods could be basically classified into different categories: (I) dye exclusion methods such as trypan blue dye exclusion assay, (II) methods based on metabolic activity, (III) ATP assay, (IV) sulforhodamine B assay, (V) protease viability marker assay, (VI) clonogenic cell survival assay, (VII) DNA synthesis cell proliferation assays and (V) raman micro-spectroscopy. In order to choose the optimal viability assay, the cell type, applied culture conditions, and the specific questions being asked should be considered in detail. This particular review aims to provide an overview of common cell proliferation and cytotoxicity assays together with their own advantages and disadvantages, their methodologies, comparisons and intended purposes.