**Methods of gene delivery in plants and animals**

1. **Transfection or transformation Technologies**

Transfection or transformationcommonly refers to the introduction of nucleic acids into cells. It is the process of artificially introducing nucleic acids (DNA or RNA) into cells, utilizing means other than viral infection. Such introductions of foreign nucleic acid using various chemical, biological, or physical methods can result in a change of the properties of the cell.

In transfection, the introduced nucleic acid may exist in the cells transiently, such that it is only expressed for a limited period of time and does not replicate, or it may be stable and integrate into the genome of the recipient, replicating when the host genome replicates.

The introduction of nucleic acids into cells is one of the most valuable and frequently used tools of biological science. Transfection methods are used for a range of applications, including gene function studies, modulation of gene expression, biochemical mapping, mutational analysis and production of recombinant proteins.

The methods of gene delivery which are commonly used today can be classified into three groups:

1. Methods that make use of genetically engineered viruses
2. Chemical methods or methods that rely on carrier molecules
3. Physical methods or methods that deliver nucleic acids directly to the cytoplasm

Not all transfection methods can be applied to all types of cells or experiments, and there is wide variation with respect to the achieved transfection efficiency, viability, level of gene expression etc. Determination of the best method for a specific application depends on several factors like cell type (primary cells or cell line), cellular context (*in vitro*, *in vivo*, *ex* *vivo*), transgene capacity, general safety, desired efficiency, cost, time etc.

1. **Gene delivery in plant cells**

Besides making use of the above-mentioned technologies, foreign DNA is transferred into plant cells by using a bacterium, *Agrobacterium tumefaciens*.