Plasmid

Genomic DNA, in contrast to extra-chromosomal DNAs like plasmids.

Plasmids are double-stranded and generally, circular DNA sequences that are capable of automatically replicating in a host cell. Plasmid vectors minimalistically consist of an origin of replication that allows for semi-independent replication of the plasmid in the host. Plasmids are found widely in many bacteria, for example in Escherichia coli, but may also be found in a few eukaryotes, for example in yeast such as Saccharomyces cerevisiae.

Bacterial plasmids may be conjugative/transmissible and non-conjugative:

conjugative: mediate DNA transfer through conjugation and therefore spread rapidly among the bacterial cells of a population; e.g., F plasmid, many R and some col plasmids. nonconjugative- do not mediate DNA through conjugation, e.g., many R and col plasmids.

The pBR322 plasmid is one of the first plasmids widely used as a cloning vector.

Plasmids with specially-constructed features are commonly used in laboratory for cloning purposes. These plasmid are generally non-conjugative but may have many more features, notably a "multiple cloning site" where multiple restriction enzyme cleavage sites allow for the insertion of a transgene insert. The bacteria containing the plasmids can generate millions of copies of the vector within the bacteria in hours, and the amplified vectors can be extracted from the bacteria for further manipulation. Plasmids may be used specifically as transcription vectors and such plasmids may lack crucial sequences for protein expression. Plasmids used for protein expression, called expression vectors, would include elements for translation of protein, such as a ribosome binding site, start and stop codons.

Reprogramming adult human fibroblasts to induced neural stem cell (iNSC) by plasmid vectors and basic neural medium without small molecules is possible and feasible. However, a full set of pluripotency-associated transcription factors may indeed result in the acquisition of a transient (at least partial) pluripotent intermediate during reprogramming. In contrast to previous reports, the EBV-based plasmid system remained present and active inside the cells at all time points ¹⁾.

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Capetian P, Azmitia L, Pauly MG, Krajka V, Stengel F, Bernhardi EM, Klett M, Meier B, Seibler P, Stanslowsky N, Moser A, Knopp A, Gillessen-Kaesbach G, Nikkhah G, Wegner F, Döbrössy M, Klein C. Plasmid-Based Generation of Induced Neural Stem Cells from Adult Human Fibroblasts. Front Cell Neurosci. 2016 Oct 24;10:245. eCollection 2016. PubMed PMID: 27822179; PubMed Central PMCID: PMC5075569.

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