OPEN ACCESS Freely available online

ISSN: 2153-0602
Journal of
Data Mining in
Genomics & Proteomics

Commentary

Application of Molecular Cloning Techniques for the Identification and Expression of Viral Antigens

Tina Mateu*

Department of Genetics and Microbiology, Autonomous University of Barcelona, Barcelona, Spain

DESCRIPTION

Molecular cloning is a technique that allows the isolation and amplification of specific DNA fragments from a source organism and their insertion into a suitable vector for further manipulation and expression. Molecular cloning has been widely used in various fields of biotechnology, such as gene therapy, vaccine development, diagnostics, and drug discovery. One of the important applications of molecular cloning is the identification and expression of viral antigens, which are proteins or glycoproteins that can elicit an immune response in the host organism. Viral antigens are essential for the development of effective vaccines and diagnostics against viral infections. However, obtaining sufficient amounts of pure and functional viral antigens from natural sources is often challenging due to the low yield, high risk of contamination, and ethical issues. Therefore, molecular cloning techniques offer an alternative and efficient way to produce recombinant viral antigens in various host systems, such as bacteria, yeast, insect cells, or mammalian cells.

The general steps involved in the molecular cloning of viral antigens are as follows:

Identification and isolation of the viral antigen gene: The viral antigen gene can be obtained from different sources, such as viral genomic or cDNA libraries, PCR amplification, or reverse transcription from viral RNA. The gene sequence can be verified by sequencing and bioinformatics analysis.

Selection and construction of the cloning vector: The cloning vector is a DNA molecule that can carry and replicate the viral antigen gene in the host cell. The vector should have features such as a suitable origin of replication, a selectable marker, a multiple cloning site, and a promoter for gene expression. The vector can be either plasmid-based or virus-based, depending on the host system and the desired level of expression.

Insertion of the viral antigen gene into the vector: The viral antigen gene can be inserted into the vector by using restriction enzymes and ligases, or by using homologous recombination or site-directed mutagenesis. The recombinant vector can be verified by restriction analysis, PCR, or sequencing.

Transformation or transfection of the host cell with the recombinant vector: The host cell can be either prokaryotic or eukaryotic, depending on the compatibility with the vector and the viral antigen gene. The host cell should be able to support the replication and expression of the recombinant vector. The transformation or transfection can be done by using methods such as electroporation, heat shock, calcium chloride, liposomes, or viral vectors.

Selection and screening of the recombinant clones: The recombinant clones can be selected by using antibiotics or other markers that confer resistance to the host cell. The recombinant clones can be screened by using methods such as colony hybridization, PCR, ELISA, or Western blotting to confirm the presence and expression of the viral antigen gene.

Purification and characterization of the recombinant viral antigen: The recombinant viral antigen can be purified from the host cell by using methods such as affinity chromatography, ion exchange chromatography, gel filtration chromatography, or electrophoresis. The purity and functionality of the recombinant viral antigen can be assessed by using methods such as SDS-PAGE, mass spectrometry, immunological assays, or biological assays.

Molecular cloning techniques have enabled the identification and expression of various viral antigens from different families of viruses, such as influenza virus, hepatitis virus, Human Immunodeficiency Virus (HIV), Corona Virus (COVID-19), etc. These recombinant viral antigens have been used for developing vaccines and diagnostics against these viral infections. For example, Influenza virus Hem Agglutinin (HA) is a surface glycoprotein that mediates the binding and entry of the virus into host cells. HA is also a major target for neutralizing antibodies. Molecular cloning techniques have been used to produce recombinant HA proteins from different strains of

Correspondence to: Tina Mateu, Department of Genetics and Microbiology, Autonomous University of Barcelona, Barcelona, Spain, E-mail: mateutina@edu.es

Received: 19-Apr-2023, Manuscript No. JDMGP-23-21529; **Editor assigned:** 21-Apr-2023, JDMGP-23-21529 (PQ); **Reviewed:** 05-May-2023, QC No. JDMGP-23-21529; **Revised:** 15-May-2023, Manuscript No. JDMGP-23-21529 (R); **Published:** 22-May-2023, DOI: 10.4172/2153-0602.23.14.297

Citation: Mateu T (2023) Application of Molecular Cloning Techniques for the Identification and Expression of Viral Antigens. J Data Mining Genomics Proteomics. 14:297

influenza virus in bacteria or insect cells. These recombinant HA proteins have been used for developing subunit vaccines and diagnostic kits against influenza virus infection.

Hepatitis B virus surface Antigen (HBsAg) is a protein that forms the outer envelope of the virus particle. HBsAg is also a marker for hepatitis B virus infection and immunity. Molecular cloning techniques have been used to produce recombinant HBsAg proteins in yeast or mammalian cells. These recombinant HBsAg proteins have been used for developing vaccines and diagnostic kits against hepatitis B virus infection. HIV Envelope glycoprotein (Env) is a complex protein that consists of two subunits: gp120 and gp41. Env is responsible for binding to host cell receptors and facilitating membrane fusion. Env is also a major target for neutralizing antibodies. Molecular cloning techniques have been used to produce recombinant Env proteins from different subtypes of HIV in bacteria or mammalian cells. These recombinant Env proteins have been used for developing vaccines and diagnostic kits against HIV infection.

COVID-19 Spike protein (S) is a surface glycoprotein that mediates the binding and entry of the coronavirus into host cells. S is also a major target for neutralizing antibodies. Molecular cloning techniques have been used to produce recombinant S proteins from COVID-19 in bacteria or mammalian cells. These recombinant S proteins have been used for developing vaccines and diagnostic kits against COVID-19 infection. In conclusion, molecular cloning techniques are powerful tools for identifying and expressing viral antigens in various host systems. These recombinant viral antigens have great potential for developing vaccines and diagnostics against viral infections.