

# CONSTRUCTION OF VIRUS-LIKE PARTICLES FOR THE PREVENTION OF HEPATITIS B

## INTRODUCTION

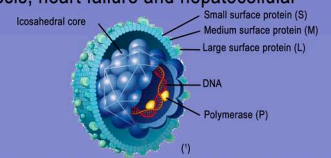
The hepatitis B virus (HBV) is the responsible for the hepatitis B, an infectious viral disease. Virus infection of hepatitis B may cause cirrhosis, heart failure and hepatocellular carcinoma.

It is estimated that more than a third of the world population have been infected with HBV, of which 20% are chronic carriers.

Its main proteins are HBsAg (in membrane) and HBcAg (in the capsid).

The first generation of vaccines prepared from plasma of asymptomatic carriers of HBsAg with little or no content of complete virions has several drawbacks.

Virus-like particles are multisubunit self-assembly-competent protein structures with identical or highly related overall structure to their corresponding native viruses.



VIRUS FAMILY STRUCTURE	GENOME PROPERTIES, GENES	EXPRESSED GENES	EXPRESSION SYSTEM
<i>Hepadnaviridae</i> icosahedral T=4	Partially dsDNA, ~3.2 kb, genes for surface (HBsAg) and core (HBcAg) proteins	HBsAg or HBcAg proteins	Bacterial, yeast, insect or plant

Could this therapy be used to generate effective vaccines for the prevention of hepatitis B?

## RESULTS

### SELF ASSEMBLY

- Cloning and expression of viral structural genes.
- Choice of expression system:
  - Bacterial system
  - Yeast system
  - Insect system
  - Plant system

### PURIFICATION

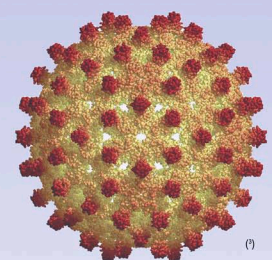
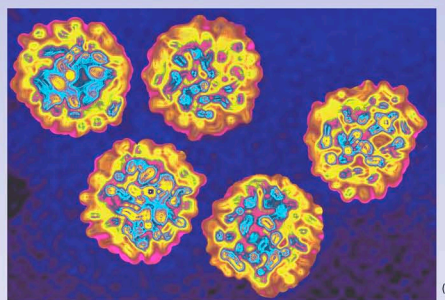
- The lysis of the cell to transfer the synthesized VLPs to the solution.
- The clarification process to insure the removal of cell debris and large aggregates.
- The concentration step.
- The polishing step to remove the residual host or target product-derived impurities.

### CHARACTERIZATION

- Analyze the properties of the VLPs to verify its future application
- A valuable tool on the analysis of the VLPs composition is mass spectrometry
- It's necessary an electron microscopy analysis as a final test

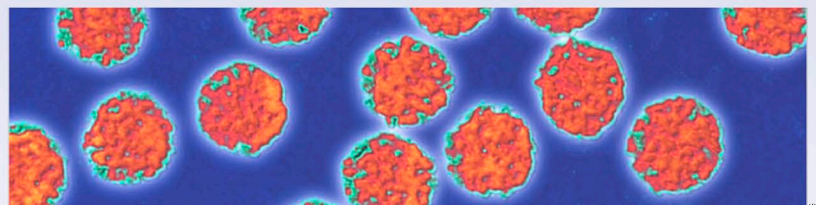
## DISCUSSION

- *Pichia pastoris*: It is usually chosen for its relatively simple fermentation design and its high density at the end.
- The purification process is, however, the one that increases the cost of the construction and, therefore, generates the most controversy.
- As long the VLPs of HBV vaccines seem to be succesful, pathogens that directly affect immune cells and that successfully evade the immune system have proved to be more difficult to construct.



## CONCLUSIONS

- It seems that virus-like particles are a great alternative to the method that was previously used for the generation of vaccines.
- Some clinical studies confirm that the effect of the VLPs vaccine is higher.
- The effectiveness of the key steps for the large-scale production of HBsAg had not been described yet.
- These vaccines could be used for such complicated diseases that still don't have prophylactic treatment.



## BIBLIOGRAPHY

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