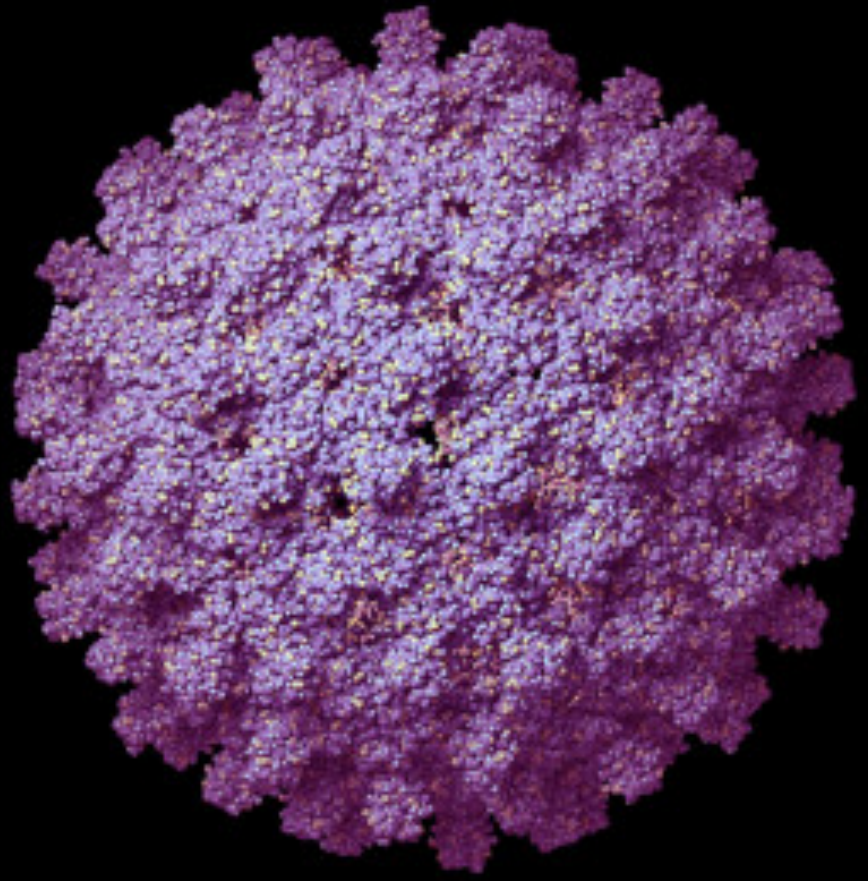
Office hours

Today: 4-5 pm, 447 Weill Hall
Tuesday: 1:30-2:30 pm, 447 Weill Hall
Wednesday: 10-11 am, 447 Weill Hall

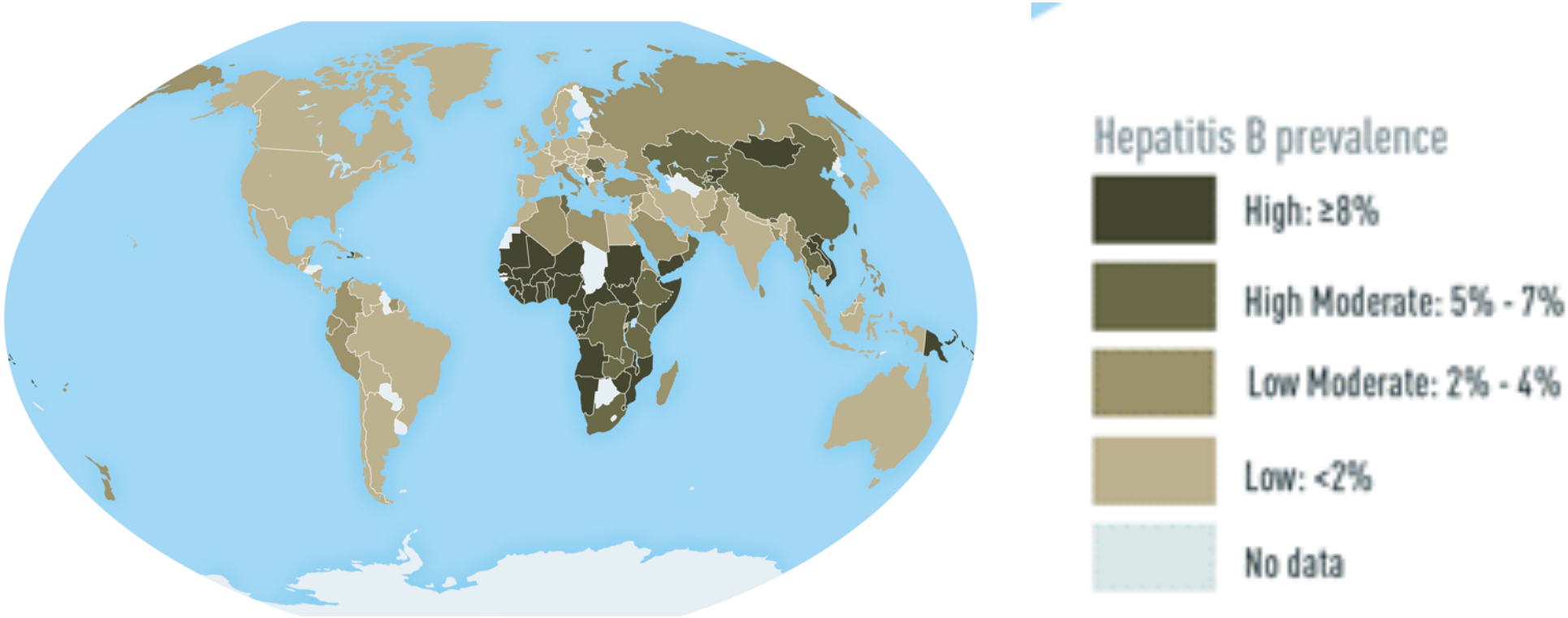
You can also join by Zoom:

- https://berkeley.zoom.us/j/92373074633

Hepatitis B virus



IMPORTANCE A fourth of the world's population has been infected with hepatitis B virus (HBV), and an estimated 250 million people are chronically infected, putting them at risk for progressive liver disease, liver cirrhosis, liver failure, and hepatocellular carcinoma (estimated 887,000 deaths per year).



How is Hepatitis B spread?

The Hepatitis B virus is spread when blood, semen, or other body fluids from an infected person enters the body of someone who is not infected. The virus can be spread through:

Sexual transmission (common means of transmission in US..)

Intravenous drug use

Blood transfusion

Vertical transmission at birth (common in endemic area)

Hepatitis B is **not** spread through breastfeeding, sharing eating utensils, hugging, kissing, holding hands, coughing, or sneezing. Hepatitis B is also not spread by contaminated food or water.

What is the likelihood that acute hepatitis B will become chronic?

The likelihood that hepatitis B will develop from an acute infection into a chronic infection depends on the age of the person infected. The younger a person is when infected with hepatitis B virus, the greater the chance of developing a chronic infection.

about 5% of adults will become chronically infected.

Approximately 25%–50% of children infected between the ages of 1 and 5 years will develop chronic hepatitis B

90% of infected infants will develop chronic infection

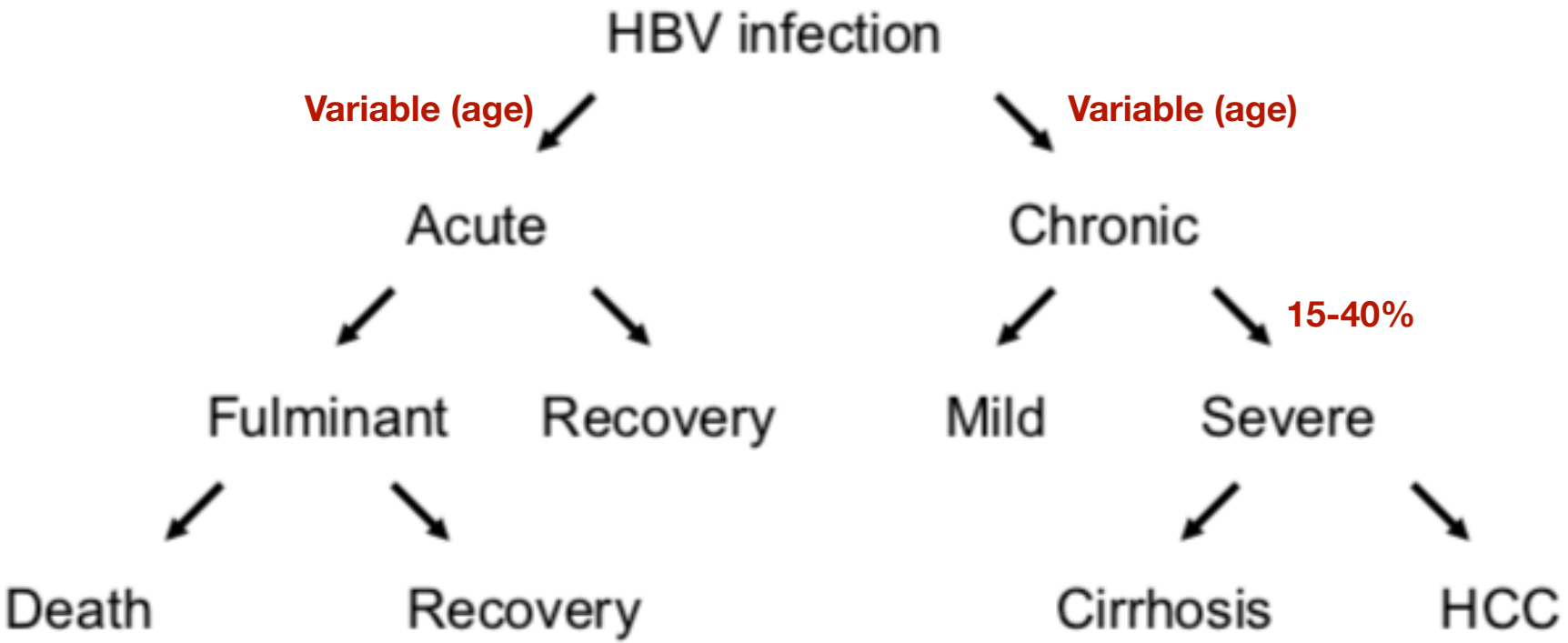
Post-exposure prophylaxis of newborns

Approximately 90% of children who are infected at birth or during the first year of life will become chronically infected; only 5% of newly infected adults become chronically infected.

Post-exposure prophylaxis of newborns born to chronically infected mothers is 85%–95% effective when administered within 12 hours of birth. Timing of the birth dose is critical to achieve the highest rates of protection.

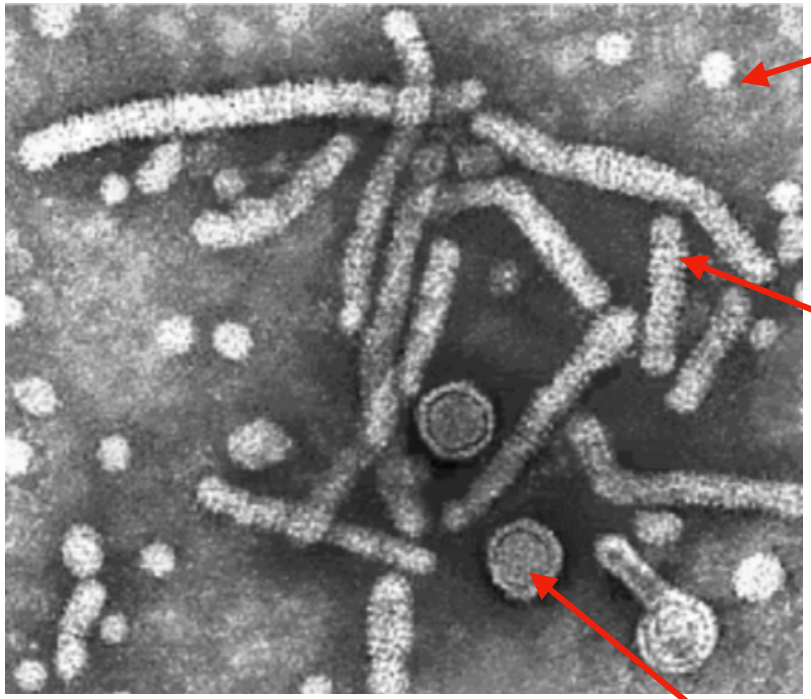
Prophylaxis consists of hepatitis B vaccine along with hepatitis B immune globulin (HBIG).

Spectrum of liver disease after HBV infection



Individuals chronically infected with hepatitis B have a 15% to 40% lifetime risk of developing liver cancer. In the United States, chronic infection with the hepatitis C virus is the leading cause of liver cancer because of the greater number of Americans infected with this virus.

The first time HBV was seen is in 1971 and surprisingly it was discovered that it can adopt multiple shapes. The Dane particles being the infectious particles.



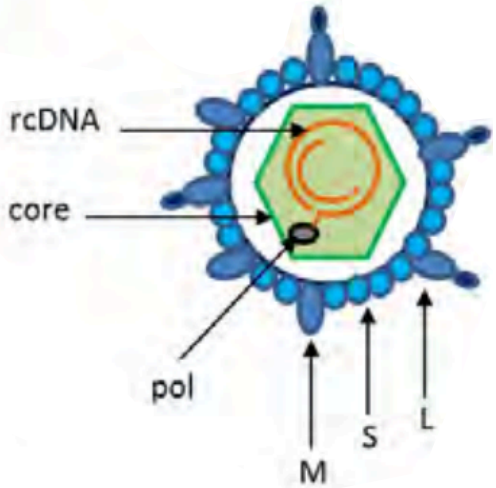
Ultrastructural examination of sera from hepatitis B patients shows three distinct morphological forms.

Most abundant are small, spherical, noninfectious particles, containing HBsAg (Hepatitis B virus surfaceAntigen). **(10E13)**

Tubular, filamentous forms of various lengths, but with a diameter comparable to that of the small particles, are also observed. They also contain HBsAg polypeptides. **(10E10)**

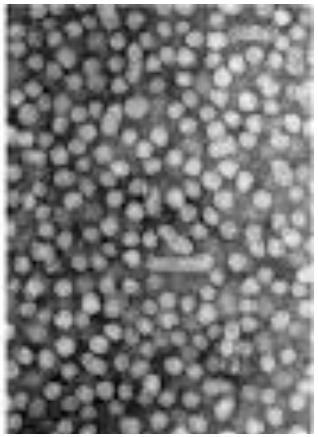
The third morphological form, the Dane particle, is the hepatitis B virion **(10E9)**

A brief history



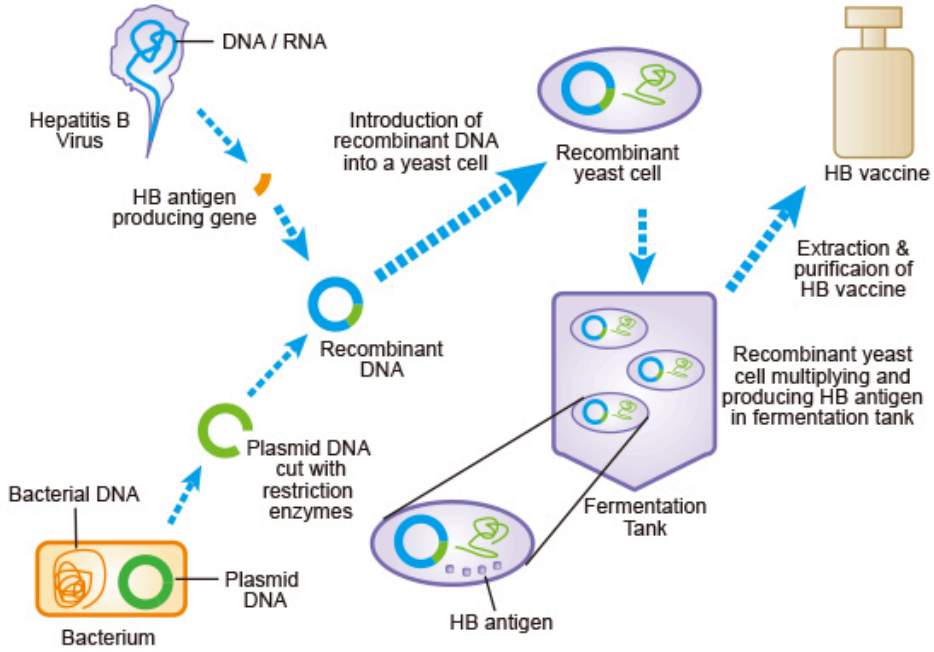
Danes Particles
10^9

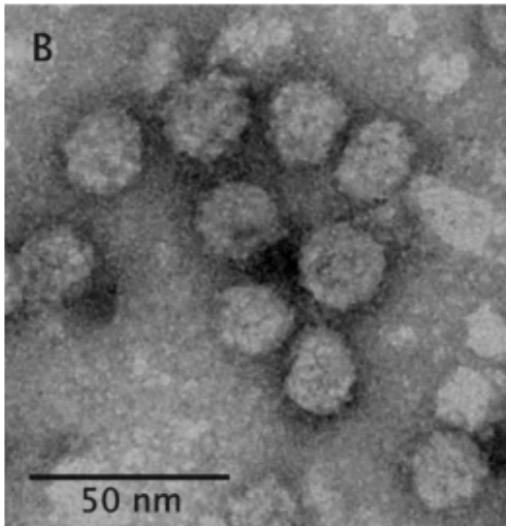
Filaments
10^{10}



Spheres
10^{13}

HBV vaccine represents the first licensed vaccine of any kind produced by recombinant technology





This vaccine has been used in hundreds of millions of individuals with an outstanding record of safety and impact on the disease.

Carriage of HBV has already been reduced from high prevalence to low prevalence in immunized cohorts of children in many countries.

Available Therapies for the Treatment of Chronic HBV Infection

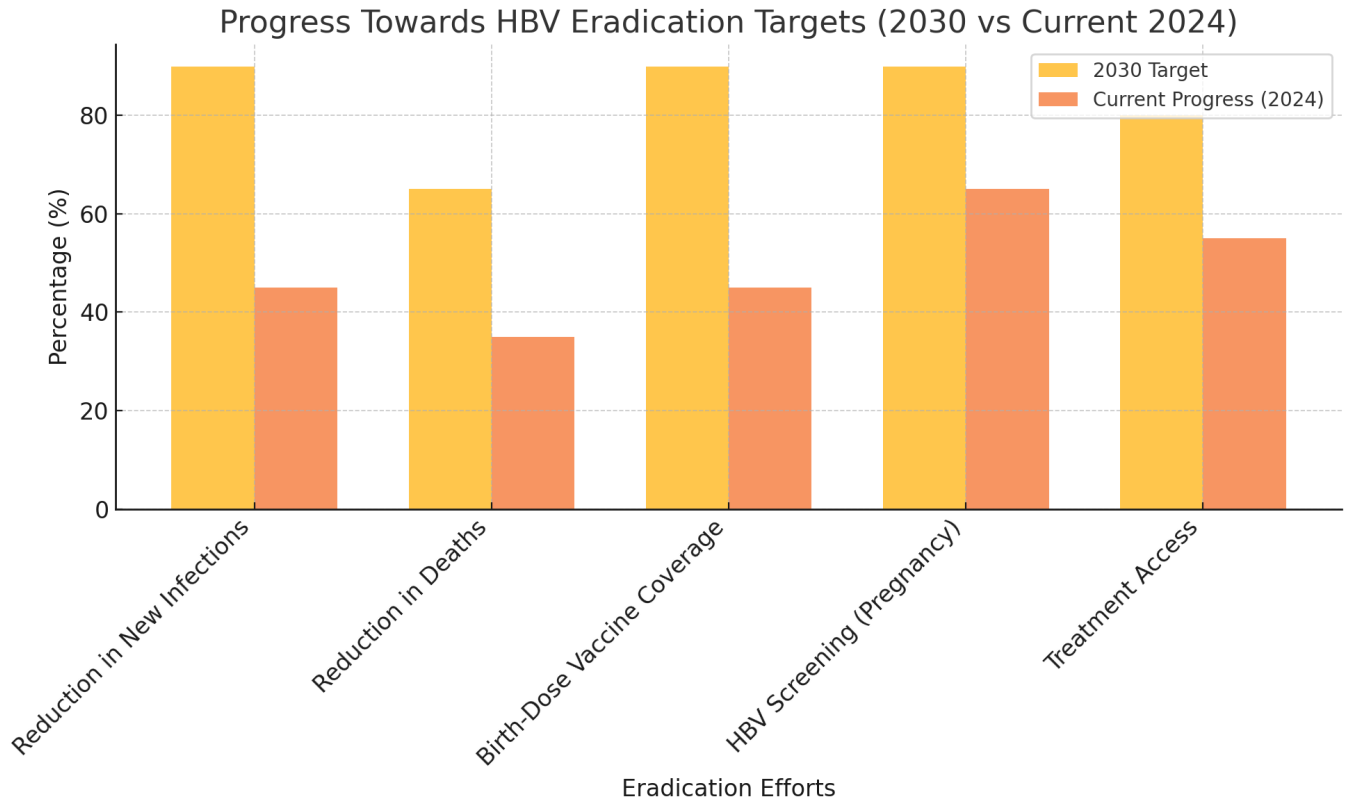
(Treatments aim to reduce viral load and prevent liver complications)

These antiviral treatments can be categorized into 2 groups:

- **Interferons:** The exact mechanism through which interferons have an antiviral effect agains HBV is not fully understood, but it is believed to have both direct antiviral and host immunomodulation effects.

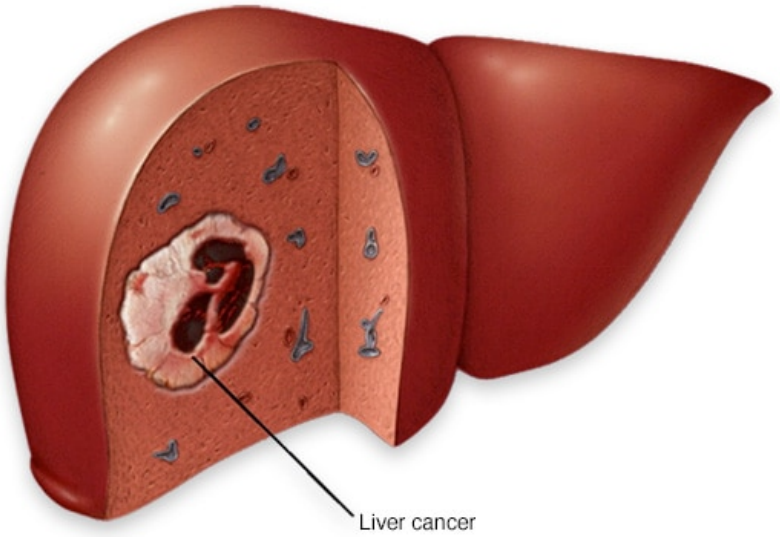
- **Nucleoside analogues:** They mainly act by inhibition of HBV polymerase activity resulting in decrease of viral replication. Nucleoside analogues are oral medications. These drugs are well tolerated and adverse effects are generally mild

Hepatitis B virus (HBV) is a focus of the World Health Organization's (WHO) global elimination efforts



Liver cancer is one of the leading causes of cancer deaths worldwide, about 800,000 deaths annually.

Primary liver cancer is the eighth most common cancer in the world. > 50% are attributed to **HBV** .



Treatment of liver failure and hepatocellular carcinoma

Liver transplantation is considered gold standard

Viral reactivation in the graft recipient can be detrimental

high-dose hepatitis B immunoglobulin and anti-viral drugs have achieved remarkable success by suppressing viral replication and improving long-term survival